FEBRUARY 1990

SAMPLING PLAN

REMEDIAL INVESTIGATION / FEASIBILITY STUDY
NAVAL AIR STATION ALAMEDA
ALAMEDA, CALIFORNIA

VOLUME I

DEPARTMENT OF THE NAVY
WESTERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
SAN BRUNO, CALIFORNIA 94066-0727

SAMPLING PLAN
REMEDIAL INVESTIGATION/FEASIBILITY STUDY

NAVAL AIR STATION ALAMEDA
ALAMEDA, CALIFORNIA

Canonie Environmental

CanonieEnvironmental

Canonie Environmental Services Corp.
1825 South Grant Street
Suite 260
San Mateo, California 94402

Phone: 415-573-8012
FAX: 415-573-5654

February 12, 1990

86-018-15

Ms. Bella G. Dizon (Code 1813BD)
Western Division Naval Facilities
Engineering Command
PO Box 727
San Bruno, CA 94066-0727

Transmittal
Final Sampling Plan, Volume 1
Remedial Investigation/Feasibility Study
Naval Air Station Alameda
Alameda, California

Dear Ms. Dizon:

Enclosed are 20 copies of the final Sampling Plan, Volume 1 of the Remedial Investigation/Feasibility Study Work Plan at the Naval Air Station Alameda.

This report completes a portion of the work authorized under Contract No. N62474-85-D-5620 Delivery Order 0008.

If you have any questions, please call us.

Respectfully submitted,

C C White Jr

Claude Carlos White, Jr.
Project Engineer

CCW/er

Enclosures

TABLE OF CONTENTS

TABLE OF CONTENTS
(Continued)

TABLE OF CONTENTS
(Continued)

TABLE OF CONTENTS
(Continued)

TABLE OF CONTENTS
(Continued)

TABLE OF CONTENTS
(Continued)

TABLE OF CONTENTS
(Continued)

TABLE OF CONTENTS
(Continued)

TABLE OF CONTENTS
(Continued)

TABLE OF CONTENTS
(Continued)

TABLE OF CONTENTS
(Continued)

TABLE OF CONTENTS
(Continued)

LIST OF TABLES

LIST OF TABLES
(Continued)

LIST OF TABLES
(Continued)

LIST OF FIGURES

LIST OF FIGURES
(Continued)

LIST OF APPENDICES

1.0 INTRODUCTION

1.1 Introduction

The Work Plan for the Remedial Investigation/Feasibility Study (RI/FS) at NAS Alameda consists of the following planning documents:

Volume 1	Sampling Plan
Volume 1A	Sampling Plan - SWAT Proposal Addendum
Volume 1B	Air Sampling Plan
Volume 2	Health and Safety Plan
Volume 3	Quality Assurance Project Plan - Quality Assurance/Quality Control Plan
Volume 4	Community Relations Plan
Volume 5	Project Management Plan/Schedule
Volume 6	Data Management Plan
Volume 7	Public Health and Environmental Evaluation Plan
Volume 8	Feasibility Plan

1.2 Work Plan Objectives

The objectives of the NAS Alameda site investigation work plan are to determine if contamination of soil and ground water has occurred in areas which have been identified as potential waste release sites. These objectives will:

1. Determine the nature and full extent of hazardous substance of contamination of air, soil, surface water and ground water at the site and contamination from the site, including off-site areas affected by the site;

2. Identify all existing and potential migration pathways, including the direction, rate and dispersion of contaminant migration, within and beyond the site;

3. Determine the magnitude and probability of actual or potential harm to public health or welfare or to the environment posed by the threatened or actual release of hazardous substances or hazardous wastes at the site;

4. Identify and evaluate appropriate remedial action to prevent future releases and mitigate any releases which have already occurred;

5. Collect and evaluate the information necessary to prepare a Remedial Action Plan in accordance with Section 25356.1 of the California Health and Safety Code.

This Remedial Investigation Work Plan, while initiated under the Naval Assessment and Control of Installation Pollutants (NACIP) program purview, has been written to satisfy the Comprehensive Environmental Response, Compensation, and Liability Act as amended by the Superfund Amendments and Reauthorization Act of 1986 (CERCLA/SARA) remedial investigation program developed by the U.S. Environmental Protection Agency (EPA). It is consistent with EPA guidance on CERCLA/SARA Remedial Investigation (RI) Work Plan development.

The sampling program will proceed in several stages, with elements of the FS to be conducted concurrently with the RI. Sampling during the initial stage will be limited to that necessary for development of a general understanding and characterization of the sites. This program uses the following documents as a primary guidance for its implementation:

1. The California Site Mitigation Decision Tree Manual, California Department of Health Services, 1986.

2. Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA, U.S. Environmental Protection Agency, 1988.

Data from the initial stage will be used as a part of the FS to evaluate potential remedial alternatives.

Identification of the alternatives will allow the subsequent sampling stages to focus on specific data requirements. Any data gaps pertaining to the feasibility analysis of the alternatives will be addressed in the subsequent sampling stages.

This staged method will enable this sampling program to be directed toward accumulating data relevant to remedial action selection. By targeting the sampling and analysis data, quality can be maximized and collecting of unnecessary data will be minimized.

1.3 Past RI/FS Activities

The U.S. Navy started RI/FS studies of chemical concentrations in the soil and water at NAS Alameda under the Naval Assessment and Control of Installation Pollutants (NACIP) program. An Initial Assessment Study (IAS) was conducted by Ecology and Environment Inc. (E&E, 1983). The next investigation was a Confirmation Study (CS) of the sites identified for further investigation in the IAS. Wahler (1985) conducted work on the CS.

Canonie Environmental Services Corp. (Canonie) was retained by the Navy in February 1988 to review the EPA and DHS' comments concerning the IAS and CS reports; and develop a sampling plan to satisfy RI/FS guidance.

1.4 Geographical Description

The Alameda Naval Air Station (NAS) occupies the western tip of the Island of Alameda and is located in Alameda and San Francisco Counties, California. Alameda Island is found along the eastern side of San Francisco Bay, as shown on the location map (Figure 1-1). NAS Alameda occupies approximately 2,634 acres (Figure 1.2). Roughly 2,479 acres of the base are owned by the government, and 155 acres are leased from others. Approximately 1,526 acres of the air station is above water, and 1,108 acres is below water. The station also holds an aviation airspace easement for approximately 120 acres (Wahler, 1985).

The station is rectangular in shape, approximately 2 miles in length, and 1 mile in width. The station is essentially flat, with typical elevations of 10 to 15 feet above sea level. Much of the dry land portion of the station, including all of the western portion, occupies reclaimed marsh and open water which has been filled. A substantial proportion of the fill used in this reclamation is dredge spoils from San Francisco Bay and the so-called Oakland Estuary, which separates the island from the mainland just to the north (Wahler, 1985).

1.5 Geologic and Hydrologic Conditions

1.5.1 Geology

Most of the soil beneath the station area is moderately to poorly compacted silty sand and sand fill. The thickness of this unit ranges from 6 to 8 feet. Beneath the fill, soft silty clay (bay mud) extends to depths of 25 to 120 feet below the existing ground surface. The soil below the bay mud consists of loose to dense silty and clay sands, and stiff to very stiff sandy clays. The soils on the station are predominantly coarse textured, have a low water-holding capacity and, except for a small area on the west side next to the San Francisco Bay, the soils are well-drained. [Ecology and Environment (E&E), 1983].

Depth to bedrock at the site is not known. A map published by the U.S. Geological Survey (Radbruch, 1957) indicates that exploration borings made in the vicinity penetrated to depths up to 354 feet without encountering bedrock. A boring about 1-mile northwest of NAS Alameda encountered bedrock at an elevation of 433 feet (mean lower low water datum). Bedrock at this location was described as yellow shale. In borings that did not reach bedrock, the soils consisted primarily of clays with interbedded sandy and gravelly layers.

There is no evidence of any fault traversing the site. However, the site is located approximately 6 miles west of the Hayward Fault and approximately 12.5 miles east of the San Andreas Fault. These faults are known to be active and have been the cause of major earthquakes in the past. Destructive earthquakes have occurred in the San Francisco Bay area in 1836, 1838, 1861, 1865, 1868, 1906, and 1989. Other less severe, but damaging earthquakes, have also occurred in the area (E&E, 1983).

1.5.2 Hydrology

There are no significant natural surface water drainages within the station. Precipitation is removed through infiltration, sheet-runoff, and artificial storm drainage. It is believed that essentially all surface and ground water leaving the station is discharged into the surrounding bay and estuary (Wahler, 1985). The average ground water underflow rate to the bay and estuary is believed to be 15 gal/day/foot of shoreline. However, for any significant segment of shoreline, this rate may vary significantly depending on a variety of factors including precipitation, drainage, grading, and soil permeability (E&E, 1983).

Significant quantities of ground water are first encountered at a depth of only a few feet, and recur in permeable sand zones throughout the underlying formations. Two wells completed in these lower zones were removed from service due to water quality problems (high background levels of naturally occurring mercury). Presently, one of these wells, the Army

Well, was reactivated and is currently being used for irrigational purposes. However, in general, the ground water beneath Alameda Island is not considered a public drinking water supply, nor is it likely to be in the future (E&E, 1983).

2.0 FIELD INVESTIGATION APPROACH

The following subsections describe the procedures to be included as part of the field investigation program at NAS Alameda.

2.1 Mobilization

Organization is critical to the successful implementation of a field sampling plan. An integrated approach has been developed which allows maximum utilization of personnel and material in achieving the objectives of this sampling plan.

A mobile trailer will be used to serve as a command post and supply depot for the site investigation. The trailer will serve as a supply depot for all health and safety equipment, portable sampling equipment, sample jars and bottles, and sample shipping containers. The trailer will also contain copies of all maps and written information and instructions pertaining to the field investigation. All sample document and chain-of-custody forms needed to record and ship samples will be kept in the trailer.

The field trailer will also serve as a communication base for the coordination of field activities. If necessary, the field teams will be supplied with portable 2-way radios which will allow instant communication between the field teams and the command center. Field personnel will be made aware that unauthorized radio communication could interfere with the normal base operations and will broadcast using only radio frequencies and power levels which have been pre-approved by the Navy.

A large fenced storage area with a lockable gate will be utilized to contain two drill trucks, two pick-up trucks, a steam generator, and material supplies such as hollow stem augers, casing PVC pipe, sand and cement. If an appropriate area cannot be allocated by the Navy for use during this field effort, such an area will be constructed.

The trailer should be situated next to the secured storage area to facilitate safety meetings to reduce the mobilization time each morning to a minimum. The ideal location would be isolated from normal base activities to minimize disruption of ongoing naval operations. It should also be a paved area to reduce any complications created by inclement weather and have restricted access to protect naval personnel during equipment decontamination. The site should also be easily accessible by equipment and personnel. The paved parking area west of Building 608 meets these criteria (see Figure 2-1). This proposed location is subject to review by and consent of the Navy.

A portable bathroom will be set up next to the field trailer for use by field personnel. The field trailer will require a telephone line feed and an electrical power line to conduct field operations. The consent and assistance of the Navy will be required to meet these requirements.

The decontamination of equipment is necessary to safeguard worker health, minimize the possibility of spreading of contamination, and ensure the accuracy of analytical results of samples collected with the equipment. All personnel and hand-held monitoring and sampling equipment will be decontaminated at each site (refer to the Health and Safety Plan for decontamination procedures).

The wash waters used for decontamination will be collected and stored in Department of Transportation (DOT) approved 55-gallon drums for later disposal. The wash water will be characterized prior to disposal. The drums will be stored either in the controlled equipment storage area or at a hazardous waste storage generator accumulation point designated by the Navy Project Coordinator. The choice of the appropriate storage area is subject to approval by the Navy Project Coordinator. Samples of wash water will be analyzed to determine whether the liquids can be disposed of onsite or whether they will require offsite disposal. No disposal of contaminated wash water will take place on-site.

Any downhole equipment used in a boring must be decontaminated before reuse. Because many of the borings specified in this plan are shallow (less than 15 feet), enough hollow stem auger equipment will be supplied to complete four 15 feet borings without reusing any downhole equipment. This will minimize the down-time associated with cleaning equipment between borings.

Where possible the recommended decontamination procedure is to clean all equipment at the site where it is used. Many of the sites to be investigated, however, are in high-traffic work areas. Most of these areas are paved and the areas of soil disrupted are extremely small. It is, therefore, believed that the danger posed by introducing contaminants into the air during soil investigation activities is minimal. In addition, the construction of a decontamination station at each site large enough to clean the heavy equipment would prove to be costly and time consuming, and cause major disruptions to ongoing work. While personnel decontamination and portable monitoring and sampling equipment decontamination can be conducted at each site, the decontamination of the truck and associated downhole equipment can be done at centralized decontamination stations. One such station (Figure 2-2) can be constructed near the mobile command center in a restricted area of the parking lot. Another decontamination station (Figure 2-3) will be constructed on the western side of the base to allow the decontamination of equipment used during the 1943-1956 Landfill and West Beach Landfill studies.

When all downhole equipment has been used at a site, all equipment used can be removed (by pick-up) to a decontamination area to be cleaned for reuse. If the work at a site is completed before all downhole equipment is used, then the drill truck will be loaded with the downhole equipment and driven to the decontamination area where it and all downhole equipment will be cleaned before use at another site.

2.2 Site Reconnaissance

The site reconnaissance phase will be conducted at each site before any field sampling activities occur. The purpose of the site reconnaissance is to: familiarize field personnel with the site; identify all potential work hazards and obstructions; locate and designate specific sampling locations; define site specific health and safety procedures; and to develop work procedures that will create a minimum of disruption to ongoing work activities of base personnel in the area.

A site walkover will be conducted by field personnel to familiarize themselves with the site area. All potential work hazards such as overhead powerlines and areas of heavy equipment use will be noted.

Review of Navy station schematics has revealed a large number of subsurface utilities in the developed areas of the base. The approximate locations of these utilities have been displayed on the site figures. Many of the proposed soil boring locations needed for site characterization have been chosen to evaluate the soil conditions near certain types of utilities such as the industrial, storm, and sanitary sewer lines. All soil boring locations have been chosen to avoid dangerous utilities such as natural gas, steam, and electrical lines. It is absolutely necessary that the exact locations of these utilities be determined in the areas of investigation in order to: afford maximum protection to workers; minimize disruption to ongoing base activities; and optimize placement of sampling points in order to achieve the objectives of the sampling program. It will therefore be required that all subsurface utility lines be located by personnel from each of the corresponding utilities at each site and that these locations be marked on the surface of the site areas.

Field personnel will coordinate with the Navy Project Coordinator to confirm the presence and location of all subsurface utilities, underground tanks and other subsurface structures in the area to be investigated. The exact location of surface points where subsurface sampling will occur will be determined using this Navy information. All sampling points will be approved by the Navy Project Coordinator or designee before drilling work will begin. The locations of all subsurface utilities/surface obstructions and sampling points will be marked on the surface of paved areas with orange paint. Any sampling point located in unpaved areas will be flagged with a wooden stake.

A hollow stem auger cannot penetrate through concrete or metal plates. If a sampling point is located in an area with concrete paving, the concrete at that point will be removed by a crew using a jack hammer or concrete coring equipment. If a sampling point is covered with metal grating, this grating will be removed at that point by a crew using a cutting torch. In areas where soil gas monitoring is prescribed, sampling grids will be established to facilitate sampling during the data collection phase.

The site reconnaissance activities will also include the determination of the boundaries of exclusion zones, contaminant reduction zones and clean zones that will be observed during the data collection phase. Personnel decontamination areas will also be identified at this time.

2.3 Types of Samples

A multi-media sampling approach will be employed to characterize the nature and extent of contamination at the base and in the waters surrounding the base. Samples will be collected from the following media as part of this investigation:

- o Soil;
- o Water;
- o Sediment;

- o Air;
- o Biota.

At specific areas of the base, radiation surveys will be also conducted. Air monitoring and soil gas monitoring will be employed where applicable.

2.4 Drilling Procedures

All onsite drilling will be conducted using mobile drilling trucks capable of auguring, mud rotary, air rotary, or angle boring, and driving and retrieving split spoons. A 3-1/4 inch ID (inside diameter) continuous flight, hollow stem auger will be used to advance all borings onsite. If this method does not prove feasible, then either the mud rotary or air rotary method shall be used.

The drilling truck, augers, drilling rods, bits, pumps, tubs, circulation hoses, and any other equipment which will be used during subsurface investigations will be steam-cleaned prior to its use at the site. All equipment used during the drilling of a borehole will be steam-cleaned prior to its reuse at any other boring location.

2.5 Analytical Methods

The types of chemical analyses to be performed on samples collected at the base are based upon the information gathered during the IAS, the Verification Study and the site visit. The specific chemicals to be analyzed for are shown in Table 2.5.1. These chemicals were grouped into the appropriate chemical class, each of which has a corresponding analytical method. The methods to be utilized in analyzing the chemicals as appropriate to the specific media to be sampled (water and soils/sediments) are shown in Table 2.5.2. The sample analyses and matrices to be sampled are shown on a site-specific basis in Table 2.5.3.

As described earlier in this RI work plan, site characterization sampling and analysis activities have been planned to generate data useful during formulation of remedial measures for confirmed sites. This sector of the RI work plan specifies the soils and ground water tests necessary to support formulation of remedies within the general response actions previously identified for each site. These data are supplemental to chemical/physical data already specified, and are directly related to engineered solutions such as cap installation, excavation (removal, excavation/treatment, and in situ treatment of contaminated soils), and treatment of contaminated ground waters. Data needs have been identified consistent with the EPA guidance "Data Needs For Selecting Remedial Action Technologies" (U.S EPA, 1987).

Site specific data needs are specified in Table 2.5.4.

2.6 Sampling Procedures

Soil sampling will be executed using either of the following methods. Soil samples from unpaved sites which require only shallow sampling (less than 3 foot depth) will be collected using a hand-held auger and an 18-inch or 12-inch split spoon samplers. Samples will be collected using the procedures described in Section 5.3.2 of the Quality Assurance Project Plan (QAPP) and based on the EPA document entitled "Characterization of Hazardous Waste Sites - A Methods Manual", Vol II (EPA-600/4-84/075). Surface soil samples collected from depths between 0 and 6 inches below ground surface will be collected by driving tubes into the soil or by collecting loose soil from the surface.

Soil samples from areas which require a deeper investigation will be collected using a split spoon sampler with a 24-inch length and a 2-inch outside diameter (OD). A soil sample is collected by driving the split spoon sampler into the ground with a 140 lb weight which is repeatedly raised 30 inches and dropped onto the top of the sampler. The spoon is advanced to a predetermined depth into the ground and then withdrawn and opened to retrieve a soil sample. The sampling intervals will be determined on a site by site basis. The split spoon sampler can be advanced ahead of the hollow stem augers by lowering the spoon down through the hollow center of the augers and then driving it into undisturbed soil below the mouth of the augers. A soil sample can be taken from the desired depth interval using this method.

After a split spoon is retrieved and opened, the sample recovery will be measured. The physical characteristics of the soils will be described using the Unified Soils Classification System and logged in the field log. In the event a change in strata is observed, a sample will be collected from each stratum (providing sufficient sample is available). Once collected, the samples will be given a unique sample number, logged onto a chain-of-custody form, placed on ice in a cooler and sent to a State of California approved laboratory for analysis. Chain-of-custody procedures are identified in section 6.1.2 of the QAPP.

After the collection of each sample, the split spoons will be decontaminated prior to reuse. The primary decontamination process will be steam cleaning. An alternative decontamination process consists of placing the split spoon into a wash tub containing Alconox detergent and tap water, and cleaning the spoon with a brush. Next, the spoon will be rinsed with tap water to remove all soap and rinsed with hexane to remove any residual contaminants. The waste hexane will be collected and containerized for proper disposal. The spoon will be thoroughly rinsed with deionized water and allowed to air dry. Split spoon samplers and/or thin-walled tube samplers, if feasible, will be used to collect undisturbed soil samples for engineering parameter analysis. The thin-walled sampler consists of a 24-inch long, 3-inch outside diameter sampler that is hydraulically advanced ahead of the augers. After the sample has been retrieved, the ends of the sample will be sealed with aluminum foil and taped to retain the soil sample and to preserve the water content in the soil. The outside of the tube is indelibly marked with the site name, boring number and depth collected. The samples will be recorded using chain-of-custody procedures and sent to the appropriate soils laboratory for analyses.

Surface water samples will be collected using either Method III-1: Sampling Surface Waters Using a Dipper or Other Transfer Device or Method III-2: Use of Pond Sampler For the Collection Of Surface Water Samples. Method III-1 employs the use of a stainless steel or teflon container which can be used to transfer liquid samples from their source to a sample bottle. Using this method prevents unnecessary contamination of the outer surface of the sample bottle that occurs when the bottle is placed directly into the liquid medium. This method also allows a sample to be taken by a technician without the technician physically contacting the sampling medium.

Method III-2 is a modification of Method III-1. This method utilizes the same type of container as Method III-1 and adds an extension handle which allows retrieval of samples from areas beyond the normal reach of a technician. This method can be useful when water samples are collected from piers or the deck of a floating sampling platform.

Ground water samples will be collected from wells using Method III-9: Sampling Monitoring Wells With a Bucket-Type Bailer after they have been purged using the methods described in section 5.3.3.2 of the QAPP. Method III-9 employs a bucket-type bailer equipped with a check valve on the bottom to collect liquid samples. A stainless steel or teflon bailer will be used to collect samples.

Sediment samples will be collected from the Oakland Estuary and the Seaplane Lagoon using either Method II-5: Sampling Bottom Sludges or Sediments With a Gravity Cover or Method II-6: Sampling Bottom Sludges or Sediments With a Ponar Grab. The gravity corer is a metal tube with a removable nose piece on the bottom and a check valve on the top which is dropped into the sediment to retrieve a sample. The check valve allows water to flow through the cover as it drops to the bottom. The removable nose piece can be fitted with a core-catching device to help retain core samples. The coring device can be fitted with additional weights to increase penetration depth. The Ponar grab sampler is a clamshell-type scoop which is lowered through the water to the sediment below. The scoop can be closed from the surface to retrieve a sample. The Ponar sampler and the enclosed sample are then raised to the surface.

All sampling equipment will be decontaminated before use and prior to reuse. The decontamination procedure to be used employs the steps described in the decontamination of split spoons.

2.6.1 Evaluation of Ground Water Conditions

Ground water level measurements will be obtained at each site where monitoring wells are installed to determine the ground water flow direction and gradient, and to check for reversal in ground water flow and direction. For sites lying adjacent to surface water bodies, including San Francisco Bay, the Seaplane Lagoon, and Oakland Estuary, the location and volume of ground water discharge will also be estimated to identify impacted areas. Ground water at these perimeter sites will also be analyzed for General Minerals to determine the presence of any lens of potable water and to check for the possibility of seawater intrusion. Pressure transducers will be installed in some monitoring wells to provide a continuous record of water levels in order to determine tidal influences on ground water.

2.6.2 Identification of Receptor Population

In addition to characterizing the occurrence and distribution of chemicals at NAS Alameda, receptor populations will be identified that currently live and work in the vicinity of the site. Data will be obtained on the numbers and demographic makeup of persons employed at the site, the average duration of employment or residence at the site, the location of the nearest residential areas, schools, and playgrounds, and the frequency of usage of areas at the NAS Alameda site for activities such as jogging, riding dirt bikes, picnicking, and fishing from the sea walls and piers.

2.7 Chain-of-Custody and Document Control

All of the chain-of-custody and document control procedures described in Volume 3, The Quality Assurance Project Plan (QAPP), of the RI/FS Work Plan, will be followed.

A document and sample accounting and control mechanism will be established and employed during the execution of the field investigation program at the NAS Alameda. This accounting and control system will facilitate rapid and efficient access to all data collected during the field investigation. This system will also ensure that all laboratory results of samples collected during the field investigation are scientifically and legally defensible.

A chain-of-custody and document control system based on EPA guidelines will be employed during this field investigation. All sample custody and document control procedures and requirements outlined in the Quality Assurance Project Plan (QAPP) in Volume 3 of this workplan will be followed during the RI/FS. The EPA control and accounting system can be found in the EPA document entitled "Characterization of Hazardous Waste Sites - A Methods Manual," Vol II (EPA/600/4-84/075).

2.8 Well Surveying

Monitoring wells to be installed at the NAS Alameda facility will be surveyed and referenced to the Mean Lower Low Water (MLLW) datum. This datum was established by the U.S. Navy for nautical purposes. Referencing this datum will allow for an evaluation of the ground water flow patterns and tidal influences at the base.

Figure 2.4 is a generalized well construction design. Survey control points will be established to marks at the top of casings.

3.0 SITE SPECIFIC SAMPLING PLANS

The following section contains site specific sampling plans for the NAS Alameda field investigations. The following sites have been identified for investigation:

1) 1943-1956 Disposal Area;
2) West Beach Landfill;
3) Area 97;
4) Building 360 (Plating Shop, Engine Cleaning Shop, Paint Stripping Shop and Paint Shop);
5) Building 5 (Plating Shop, Paint Stripping Shop, Cleaning Shop, and Paint Shop).
6) Building 41;
7) Building 459, Building 547, and Building 162;
8) Building 114,
9) Building 410;
10) Building 400 and Building 530;
11) Building 14;
12) Building 10;
13) Oil Refinery;
14) Fire Training Area;
15) Buildings 301 and 389;
16) Cans C-2 Area;
17) Seaplane Lagoon;
18) Station Sewer System;
19) Yard D-13; and
20) Estuary (Oakland Inner Harbor).

The subsections of Section Three are individual site-specific sampling plans. The sites are addressed in the above order. Because some sites have multiple components, the subsection numbers do not correspond to the site numbers.

3.1 1943-1956 Disposal Area Site Investigation Sampling Plan

The sampling plan for the 1943-1956 Disposal Area, that satisfies the requirements of the Solid Waste Assessment Test (SWAT) proposal, is presented in Addendum A. Addendum A of this sampling plan is submitted as a separate document.

3.2 West Beach Landfill Site Investigation Sampling Plan

The sampling plan for the West Beach Landfill area is also presented in Addendum A, which is submitted as a separate document. The sampling plan for the West Beach Landfill satisfies the requirements of the SWAT proposal.

3.3 Area 97 Site Investigation Sampling Plan

3.3.1 Site Specific Conditions

3.3.1.1 General Description and Current Conditions

Area 97 is located immediately west of the East Gate (Figure 3.3.1). The focal point of the area is a 2-acre parcel, which previously contained five partially buried 100,000-gallon aviation gasoline (AVGAS) tanks. The zone potentially effected by leakage from the tanks is approximately 30 to 40 acres in size.

Since removal of the tanks, the central section has remained an area of exposed soil. Currently, the site is being landscaped; as of March, 1988, an aircraft had been mounted centrally in the area as an exhibit, and lawn sprinkler ditches were being installed prior to seeding and planting.

3.3.1.2 Site History

In 1975, it was discovered that three of the five AVGAS tanks were leaking. They were subsequently drained, cleaned, and filled with water. In 1978, one of the remaining two tanks was also discovered to be leaking, and consequently both tanks were drained and filled with water. Based on tank inventories, approximately 365,000 gallons of 115/145 AVGAS were estimated to have leaked from Area 97 during the late 1960s and early 1970s. These leakages have caused gasoline vapor problems in both sewer and electrical manholes, with reported incidents of explosion and fire. As of 1987, none of the five tanks remained standing in Area 97. The concrete tanks were destroyed and buried in place.

3.3.1.3 Summary of Previous Site Investigations

In response to the identification of significant leakages and hazardous conditions resulting from gasoline vapors, Kennedy Engineers was contracted in July, 1979 to investigate the extent of subsurface fuel contamination in the vicinity of Area 97. The report, dated January 17,1980 (Kennedy,1980), concluded that an area of approximately 5-1/2 acres of subsoil was affected by fuel contamination. No pooled fuel was found to be floating on the water table, suggesting that the fuel had drained through the soil and infiltrated subsurface utility lines. Fuel vapor concentrations in the explosive range were detected in sanitary sewer lines and high concentrations were also detected in electrical ducts and storm drains. During the course of the Kennedy investigation, a total of 18 observation wells were installed and sampled. A subsequent investigation was conducted by Wahler Associates, as part of the verification step of the NACIP confirmation study (Wahler, 1985). Wahler resampled 12 of the wells installed by Kennedy Engineers and installed and sampled three new wells. AVGAS was detected at significant levels in ground water, and lead was also detected at elevated levels during the Wahler study. Some of the installed monitoring wells were destroyed prior to or during the recent landscaping.

3.3.2 Sampling Objectives

The sampling objectives for Area 97 are to define the full extent of the migration and subsequent contamination of the site. Further sampling of ground water, subsurface soil, utility ducts and sewage lines is necessary to adequately evaluate the extent of a AVGAS contamination and the severity of fuel vapor build-up.

Because of the large area of suspected contamination, sample coverage from Buildings 14, 162, and 360 will be used in conjunction with the three additional sampling locations for Area 97.

The objective of the soil gas survey for Area 97 is to provide data for areas where there is inadequate ground water and/or soil samples to define the extent of contamination migration.

The types of samples to be collected and analyses to be performed have been developed using information gathered during the March, 1988 site visit, review of existing reports, and review of the comments and concerns of the EPA and DHS. The sample types and analyses for Area 97 can be seen in Table 3.3.1.

3.3.3 Site Reconnaissance

The specific objective of the Area 97 site reconnaissance is to define the optimum placement of the 100-foot soil gas grid. The actual sampling locations will be contingent on such factors as local traffic, subsurface hazards, surface conditions, and available power supply.

3.3.4 Soil Gas Monitoring Survey

Soil gas monitoring will be used to define the petroleum hydrocarbon contaminant plume and to determine the optimal placement of proposed monitoring wells and/or soil borings (Figure 3.3.1) in Area 97. A 100-foot sampling grid will be established during the site reconnaissance phase of the investigation (Figure 3.3.1). The soil gas survey will be performed using a truck-mounted system equipped with a gas chromatograph.

3.3.5 Soil Sampling

Figure 3.3.1 shows all subsurface utilities and obstructions identified on the Area 97 site during review of Navy maps and documents. Figure 3.3.1 illustrates the proposed soil boring and monitoring well locations for this area. These actual locations will be determined by field personnel after all the utilities and obstructions shown in Figure 3.3.1 have been identified and located.

All relevant regulatory agencies will be notified before borings are begun. All preparation work at each site (see Site Reconnaissance section) must be completed before field sampling can begin.

Surface soil samples will be collected at the location of each soil boring prior to set-up of the drilling equipment. Soil borings will be advanced to a depth of 15 feet. Continuous soil samples will be collected from each boring, and borings will be lithologically logged. Split spoon samplers will be used to collect soil samples for contaminant analyses. Split spoon and/or thin-walled tube samplers will be used to collect undisturbed soil samples for physical property analyses. The type and number of soil samples to be collected from each boring is presented in Table 3.3.2. The order in which these samples are collected from a boring is left to the discretion of the field personnel. The types of analyses to be performed on soil samples is presented in Table 3.3.1. All borings not designated for monitoring well installation will be backfilled with cement/bentonite grout and where appropriate, capped with either an asphalt or concrete patch.

Soil sample collection methods have been described in Section 2. Refer to Section 5.3.2 of the QAPP for specific information regarding the collection of samples and the decontamination of equipment.

3.3.6 Monitoring Well Installation

Table 3.3.2 and Figure 3.3.1 indicate the borings in which monitoring wells will be installed. These wells will be installed to allow the continual monitoring of ground water levels and to facilitate the collection of ground water samples.

Figure 2.4 is a generalized well construction diagram. Specific well construction procedures will be outlined in Section 4.5 of the QAPP. The actual depth of screen placement will be determined in the field.

3.3.7 Ground Water Sampling

Ground water samples will be collected from the wells listed in Table 3.3.2. These samples will be analyzed for the parameters listed in Table 3.3.1. The analytical results of these samples will be evaluated to determine if any contamination is present in the ground water in this area.

Ground water samples will be collected from the monitoring wells in Area 97 after the wells have been installed, developed, and allowed a sufficient recovery time. Floating product layers and thicknesses will also be determined. Samples will also be collected from the active wells installed during the 1979 and 1985 investigations. Water level measurements will be taken and recorded at each well prior to purging and sampling. A sufficient number of water samples will be collected to allow for the analyses of the ground water parameters listed on Table 3.3.1. Refer to Section 5.3.3 of the QAPP for information regarding well purging and sample collection procedures. The types of samples to be collected and the preservation method for these samples are also listed in Section 5.3.3 of the QAPP.

3.4 Building 360 (Plating, Engine Cleaning, Paint, and Paint Stripping Shops) Site Investigation Work Plan

3.4.1 Site Specific Conditions

3.4.1.1 General Description and Current Conditions

Building 360 occupies an area of approximately 5-1/2 acres near the eastern perimeter of the base (Figure 3.4.1). The building, in operation since 1954, houses a number of specialized process shops for the repair and testing of aircraft engines. Building 360 contains machine shops, a paint and cleaning shop, and a plating shop similar to those located in Building 5.

Processes in the plating shop include paint stripping by blasting; chrome, silver, and nickel stripping; etching; and chrome, silver, nickel, and copper plating. Cyanide and chromium processes are separated into two areas and have separate sumps. Untreated rinse water from cyanide processes enters the industrial waste collection system at approximately 5,400 gal/day. Chromium-bearing wastewaters are discharged to the industrial waste treatment facility prior to discharge to the industrial waste collection system (E&E, 1983).

Processes in the cleaning and blasting shop use baths of phenolic-base cleaners, alkaline-type cleaners, rust removers, descaling compounds, and caustics. Wastewaters are discharged to the industrial waste collection system at approximately 13,000 gal/day (E&E, 1983). At present, baths are dumped into tanks and disposed of off-base by contractors. Spent solvents are recovered to the extent possible.

In the plating shop, relatively small machine parts are painted in four paint spray booths, using similar techniques as in Building 5. Water used to control spray and solvent vapors is collected in a tank beneath the booths and reused until contaminant levels become excessive. Water is then discharged to 55 gallon drums and disposed of off-base. The paint shop also uses two degreasing tanks containing 1,1,1-trichloroethane.

3.4.1.2 Site History

As is the case at Building 5, the majority of processes that have occurred in Building 360 in the past are still in operation, although waste disposal practices have been modified. Prior to 1975, wastes from the plating shop were directly discharged to the Seaplane Lagoon. In addition, paint sludges and spent degreasing agents were routinely disposed of in the West Beach Landfill. Both trichloroethene and carbon tetrachloride were used in the degreasing process from 1950 to 1970. These agents were known to have entered the sewer system through spillage and parts rinsing.

3.4.1.3 Summary of Previous Site Investigations

As part of the NARF Industrial Waste Survey conducted in 1981, rinse composite samples from Building 360 were analyzed. Results showed the presence of low levels of metals and some organics (E&E, 1983). No ground water or soil sampling has been performed in the vicinity of Building 360. Soil samples taken from beneath the plating shop showed a high alkalinity and high levels of cyanide.

3.4.2 Sampling Objectives

The objectives of the Building 360 sampling plan is to determine if contamination has been introduced to the subsurface from surface spills or leaks in the subsurface sewer system in areas other than the plating shop. The site will be visually inspected for evidence of surface spills and releases. Any surface areas exhibiting evidence of gross surface contamination will be investigated. Further sampling will be undertaken beneath the plating shop to provide a better representation of the nature and extent of the contamination.

Soil borings will be advanced around the perimeter of the building near junction points of sewers which received effluent from these areas (Figure 3.4.2) on the basis that these junctions would be more likely to leak, and because waste may be more prone to pool at elbow and T-joints where the soil has been excavated to a greater depth.

In addition to the building perimeter sampling, it is proposed that a sample grid be placed beneath the area of the plating shop on the western side of Building 360. Therefore, surface soil samples will be taken at each node on the sampling grid within the plating shop to accurately assess the extent of contamination in this area. The samples will be taken by hand.

Monitoring wells will be installed (Figure 3.4.2) to allow the monitoring of water levels and to facilitate the sampling of ground water. The ground water samples will be analyzed to determine if contaminants are present in the ground water found in this area. Water level measurements will be used to help determine the flow patterns of ground water at the NAS Alameda area.

A site-specific and analytical sampling plan has been developed for the Building 360 area. The types of samples to be collected and analyses to be performed have been developed using information gathered during the March, 1988 site visit, review of existing reports, and the comments and concerns of the EPA and DHS.

The proposed sample types and analyses for Building 360 can be seen in Table 3.4.1.

3.4.3 Site Reconnaissance

See Section 2.2.

3.4.4 Soil Sampling

Figure 3.4.1 shows all subsurface utilities and obstructions identified at site 360 during review of Navy maps and documents. Figure 3.4.2 illustrates the proposed soil boring locations for this area. The actual boring locations will be determined by field personnel after all the utilities and obstructions shown in Figure 3.4.1 have been identified and located.

All relevant regulatory agencies will be notified before borings are begun. All preparation work at each site (see Site Reconnaissance section) must be completed before field sampling can begin.

Surface soil samples will be collected at the location of each soil boring prior to set-up of the drilling equipment. Soil borings will be advanced to a depth of 15 feet. Continuous soil samples will be collected from each boring, and borings will be lithologically logged. Split spoon samplers will be used to collect soil samples for contaminant analyses. Split spoon samplers and/or thin-walled tube samplers will be used to collect undisturbed soil samples for physical property analyses. The type and number of soil samples to be collected from each boring is presented in Table 3.4.2. The order in which these samples are collected from a boring is left to the discretion of the field personnel. The types of analyses to be performed on soil samples is presented in Table 3.4.1. All borings not designated for monitoring well installation will be backfilled with cement/bentonite grout and where appropriate, capped with either an asphalt or concrete patch. Soil sample collection methods have been described in Section 2. Refer to Section 5.3.2 of the QAPP for specific information regarding the collection of samples and the decontamination of equipment.

3.4.5 Monitoring Well Installation

Table 3.4.2 and Figure 3.4.2 indicate the borings in which monitoring wells will be installed. These wells will be installed to allow the continual monitoring of ground water levels and to facilitate the collection of ground water samples.

Figure 2.4 is a generalized well construction diagram. Specific well construction procedures will be outlined in Section 4.5 of the QAPP. The actual depth of screen placement will be determined in the field.

3.4.6 Ground Water Sampling

Ground water samples will be collected from the wells listed in Table 3.4.2. These samples will be analyzed for the parameters listed in Table 3.4.1. The analytical results of these samples will be evaluated to determine if any contamination is present in the ground water in this area.

Ground water samples will be collected from the monitoring wells after the wells have been installed, developed, and allowed a sufficient recovery time. Water level measurements will be taken and recorded at each well prior to purging and sampling. A sufficient number of water samples will be collected to allow for the analyses of the ground water parameters listed on Table 3.4.1. Refer to Section 5.3.3 of the QAPP for information regarding well purging and sample collection procedures. The types of samples to be collected and the preservation method for these samples are also listed in Section 5.3.3 of the QAPP.

3.5 Building 5 (Plating, Paint Stripping, Cleaning, and Paint Shops) Site Investigation Work Plan

3.5.1 Site Specific Conditions

3.5.1.1 General Description and Current Conditions

Building 5 occupies an area of approximately 18-1/2 acres between First and Second Streets (Figure 3.5.1). The building was constructed in 1942, and houses a variety of activities including cleaning, reworking and manufacturing of metal parts; tool maintenance; plating; painting, paint stripping, and conversion coating.

Operations in the plating shop include degreasing, caustic and acid etching, metal stripping and cleaning; and chrome, nickel, silver, cadmium, and copper plating. Wastes include rinse tank wastewater, concentrated bath dumps, plating tank sludges, caustic cleaners, and cyanide stripper bath dumps. Cyanide and chromium processes are in separate areas. Since 1975, chromium process wastewaters have been discharged to the industrial waste treatment at 19,200 gal/day. Cyanide process wastewaters are discharged directly to the industrial sewer system at 14,400 gal/day. Depending upon production rates, some baths are dumped 0 to 4 times/year. Since 1970, baths have been pumped and waste stored for offsite disposal (E&E, 1983).

Operations in the paint shops include two paint bays and several spray paint booths. Small amounts of water leak to the industrial waste collection system. The paint bay recirculation sump is pumped quarterly and disposed of offsite. Wastewater contains high levels of chromium, zinc, iron, COD, and phenol and is now being treated. Average daily flow is approximately 5,000 gal/day (E&E, 1983).

Paint stripping operations include paint stripping and conversion coating of airframe parts which use phenolic stripping compounds (spray-on/rinse-off) producing large volumes of rinse water. Wastewaters contain high levels of phenol (4,000 ppm at times), methylene chloride, chromium, oil and grease. Conversion operations use primer with chromate, activators, and dissolved aluminum and iron. Wastewaters have a high pH, aluminum, chromium and iron, and are discharged to the industrial waste treatment facility (E&E, 1083).

All operations in Building 5 generate miscellaneous nonsewerable wastes including oil, grease, spent solvents, old paints and sludges, detergents, and discarded stripping and cleaning agents.

3.5.1.2 Site History

The majority of processes and activities that have occurred in Building 5 in the past are still in operation and are described above. Some of the waste disposal practices have changed during the course of operations at Building 5. The historical disposal practices are summarized below.

Prior to 1970, the contents of the plating baths were directly discharged to the Seaplane Lagoon or the Oakland Estuary. Similarly, many of the rinse waters and wastewaters from paint stripping operations were also discharged through floor drains to the same locations, mentioned above. While no major spills or releases are documented at Building 5, tanks have reportedly overflowed on several occasions, releasing untreated waste to the storm drains (E&E, 1983).

3.5.1.3 Summary of Previous Site Investigations

One study conducted in 1981 by Post, Buckley, Schuh & Jernigan, Inc., analyzed the content of wastewater from the various processes housed in Building 5. Summary tables presented in the Initial Assessment Study (E&E, 1983), indicate elevated levels of metals, phenols, and some volatile organics. No sampling of ground water or soils has been performed in the vicinity of Building 5.

3.5.2 Sampling Objectives

The objective of the Building 5 sampling plan is to determine if contamination has been introduced into the subsurface from surface spills or from leaks in the subsurface sewer system. The types of samples to be collected and the analyses to be performed have been developed on the basis of information gathered during the March, 1988 site visit, review of existing reports, and review of the comments and concerns of the EPA and DHS.

Soil borings will be advanced around the perimeter of the building near the junction points of sewers which receive effluent from these areas. These junctions would be more likely to leak and because waste may be more prone to pool at elbow and T-joints where the soil has been excavated to a greater depth.

The potential for subsurface contamination exists from several work areas located inside Building 5. These areas are: the hangar and open bay areas used for paint stripping in the south central portion of the building; the painting area in the northeast corner of the building; the engine testing area in the northwest corner of the building; the plating shop located in the center of the building; and the painting shop in the south central area of the building.

Monitoring wells will be installed in selected borings (Figure 3.5.2) to allow the monitoring of water levels and to facilitate the sampling of ground water. The ground water samples will be analyzed to determine if contaminants are present in the ground water found in this area. Water level measurements will be used to help determine the flow patterns of ground water at the NAS Alameda area.

The proposed sample types and analyses for Building 5 along with the rationale for the analyses can be seen in Table 3.5.1.

3.5.3 Site Reconnaissance

See Section 2.2.

3.5.4 Soil Sampling

Figure 3.5.1 shows all subsurface utilities and obstructions identified at Building 5 during review of Navy maps and documents. Figure 3.5.2

illustrates the proposed soil boring locations for this area. The actual boring locations will be determined by field personnel after all the utilities and obstructions shown in Figure 3.5.1 have been identified and located.

All relevant regulatory agencies will be notified before borings are begun. All preparation work at each site (see Site Reconnaissance section) must be completed before field sampling can begin.

Surface soil samples will be collected at the location of each soil boring prior to set-up of the drilling equipment. Soil borings will be advanced to a depth of 15 feet. Continuous soil samples will be collected from each boring, and borings will be lithologically logged. Split spoon samplers will be used to collect soil samples for contaminant analyses. Split spoon and/or thin-walled tube samplers will be used to collect undisturbed soil samples for physical property analyses. The type and number of soil samples to be collected from each boring is presented in Table 3.5.2. The order in which these samples are collected from a boring is left to the discretion of the field personnel. The types of analyses to be performed on soil samples is presented in Table 3.5.1.

All borings not designated for monitoring well installation will be backfilled with cement/bentonite grout and where appropriate, capped with either an asphalt or concrete patch. Soil sample collection methods have been described in Section 2. Refer to Section 5.3.2 of the QAPP for specific information regarding the collection of samples and the decontamination of equipment.

3.5.5 Monitoring Well Installation

Table 3.5.2 and Figure 3.5.2 indicate the borings in which monitoring wells will be installed. These wells will be installed to allow the continual monitoring of ground water levels and to facilitate the collection of ground water samples.

Figure 2.4 is a generalized well construction diagram. Specific well construction procedures will be outlined in Section 4.5 of the QAPP. The actual depth of screen placement will be determined in the field.

3.5.6 Ground Water Sampling

Ground water samples will be collected from the wells listed in Table 3.5.2. These samples will be analyzed for the parameters listed in Table 3.5.1. The analytical results of these samples will be evaluated to determine if any contamination is present in the ground water in this area.

Ground water samples will be collected from the monitoring wells after the well has been installed, developed, and allowed a sufficient recovery time. Water level measurements will be taken and recorded at each well prior to purging and sampling. A sufficient number of water samples will be collected to allow for the analysis of the ground water parameters listed on Table 3.5.1. Refer to Section 5.3.3 of the QAPP for information regarding well purging and sample collection procedures. The types of samples to be collected and the preservation method for these samples are also listed in Section 5.3.3 of the QAPP.

3.6 Building 41 (Aircraft Intermediate Maintenance Department) Site Investigation Work Plan

3.6.1 Site Specific Conditions

3.6.1.1 General Description and Current Conditions

Building 41, formerly used as a hanger for seaplanes, is currently occupied by the Aircraft Intermediate Maintenance Department (AIMD). The building is one of several hangers located along the northern boundary of the seaplane lagoon. Building 41 is located the farthest east of the group (Figure 3.6.1). Activities in this building primarily involve the intermediate repair of aircraft components for transient and tenant aircraft. Items repaired include: hydraulics; brakes; avionics; engines; electrical wiring; and instrumentation.

Current conditions, described below, are based on observations made during a site visit in March, 1988. A tank containing paint stripper is located outside Building 41, on the west side of the building. Approximately 30 55-gallon drums containing a variety of wastes are also located immediately west of the building. No obvious visible signs of contamination are apparent although a storm drain is located immediately adjacent to the paint stripping tank and appears to have received some contamination from the stripping operations. A new concrete pad is present on the west apron to the hanger.

3.6.1.2 Site History

Building 41 formerly housed 55-gallon drums which were used to store wastes from ongoing repair and maintenance activities. Chemicals stored in the building included: PD680 dry cleaner; trichlorofluoroethane; 6083 oil; trichloroethane; paint wastes and strippers; and used hydraulic fluids. AIMD personnel have previously stated that more than 100 55-gallon drums containing various wastes were stored on the paved area west of the building (E&E,1983).

No known spills have been documented at Building 41, although rinse waters from the paint-stripping tank located on the outer west side of the building flowed into a sewer manhole which discharged to the East Bay Municipal Utility District (EBMUD) system.

3.6.1.3 Summary of Previous Site Investigations

No sampling of media in the immediate vicinity of Building 41 has been performed to determine whether contamination exists. Historical information describing site activities were collected during the Initial Assessment Study conducted by Ecology and Environment, Inc. (E&E,1983);

however, no further investigation was conducted in the verification step on the basis of this information.

3.6.2 Sampling Objectives

The objectives of the Building 41 sampling plan is to determine if contamination has been introduced to the subsurface from surface spills or leaks in the subsurface sewer system. The site will be visually inspected for evidence of surface spills and releases. Any surface areas exhibiting evidence of gross surface contamination will be investigated.

A soil boring will be advanced in the paint stripping area on the southwestern end of the building. Rinse waters from paint stripping activities flow down into the storm sewer system in this area.

Soil borings will be advanced around the perimeter of the building and near the junction points of sewers which received effluent from these areas (Figure 3.6.2) since these functions would be more likely to leak, and because waste may be more prone to pool at elbow and T-joints where the soil has been excavated to a greater depth. These borings will also allow soil samples to be collected from beneath the paved areas outside the building, as requested by DHS.

Monitoring wells will be installed (Figure 3.6.2) to allow the monitoring of water levels and to facilitate the sampling of ground water. The ground water samples will be analyzed to determine if contaminants are present in the ground water found in this area. Water level measurements will be used to help determine the flow patterns of ground water at the NAS Alameda area.

The types of samples to be collected and analyses to be performed have been developed using information gathered during the March, 1988 site visit, review of existing reports, and review of the comments and concerns of the EPA and DHS.

The proposed sample types and analyses for Building 41 can be seen in Table 3.6.1.

3.6.4 Soil Sampling

Figure 3.6.1 shows all subsurface utilities and obstructions identified at Building 41 during review of Navy maps and documents. Figure 3.6.2 illustrates the proposed soil boring locations for this area. The actual boring locations will be determined by field personnel after all the utilities and obstructions shown in Figure 3.6.1 have been identified and located.

All relevant regulatory agencies will be notified before borings are begun. All preparation work at each site (see Site Reconnaissance section) must be completed before field sampling can begin.

Surface soil samples will be collected at the location of each soil boring prior to set-up of the drilling equipment. Soil borings will be advanced to a depth of 15 feet. Continuous soil samples will be collected from each boring, and borings will be lithologically logged. Split spoon samplers will be used to collect soil samples for contaminant analyses. Split spoon and/or thin-walled tube samplers will be used to collect undisturbed soil samples for physical property analyses. The type and number of soil samples to be collected from each boring is presented in Table 3.6.2. The order in which these samples are collected from a boring is left to the discretion of the field personnel. The types of analyses to be performed on soil samples is presented in Table 3.6.1.

All borings not designated for monitoring well installation will be backfilled with cement/bentonite grout and where appropriate, capped with either an asphalt or concrete patch. Soil sample collection methods have been described in Section 2. Refer to Section 5.3.2 of the QAPP for specific information regarding the collection of samples and the decontamination of equipment.

3.6.5 Monitoring Well Installation

Table 3.6.2 and Figure 3.6.2 indicate the borings in which monitoring wells will be installed. These wells will be installed to allow the continual monitoring of ground water levels and to facilitate the collection of ground water samples.

Figure 2.4 is a generalized well construction diagram. Specific well construction procedures will be outlined in Section 4.5 of the QAPP. The actual depth of screen placement will be determined in the field.

3.6.6 Ground Water Sampling

Ground water samples will be collected from the wells listed in Table 3.6.2. These samples will be analyzed for the parameters listed in Table 3.6.1. The analytical results of these samples will be evaluated to determine if any contamination is present in the ground water in this area.

Ground water samples will be collected from the monitoring wells after the well has been installed, developed, and allowed a sufficient recovery time. Water level measurements will be taken and recorded at each well prior to purging and sampling. A sufficient number of water samples will be collected to allow for the analysis of the ground water parameters listed on Table 3.6.1. Refer to Section 5.3.2 of the QAPP for information regarding well purging and sample collection procedures. The types of samples to be collected and the preservation method for these samples are also listed in Section 5.3.3 of the QAPP.

3.7 Building 459 (Service Station) Site Investigation Work Plan

3.7.1 Site Specific Conditions

3.7.1.1 General Descriptions and Current Conditions

Building 459 is an active gasoline station located approximately 1/2-mile north of the east gate, on the perimeter of the station (Figure 3.7.1). The gas station is operated by the Navy Exchange, and has been functional for 24 years.

There are currently four subsurface stainless steel tanks located on the northern boundary of the gas station, each of which have an approximate capacity of 10,000 gallons. Three of the four tanks are used at present and contain gasoline. The fourth tank has been taken out of service due to suspected leakage. There is also one subsurface steel tank located adjacent to an auto shop on the western side of site 459, which reportedly contains waste oils from auto maintenance activities. The tank is periodically emptied, but has been known to overflow on occasions.

3.7.1.2 Site History

In addition to the four gasoline tanks currently located at Building 459, there were two tanks that were installed at an earlier date. These have been removed as a result of leakage. During this removal action, a visible oil sheen was reported in the pipeline trenches. This area has since been backfilled and paved.

3.7.1.3 Summary of Previous Site Investigations

No sampling and analysis of soil or ground water has been performed at Building 459. However, a tank testing study on NAS Alameda, which included Building 459, was recently completed by Environmental Resources Management (ERM-West, 1987). Results of this study showed that three of the four tanks at 459 had plumbing leaks. The fourth tank, as previously discussed, had been removed from service at an earlier date.

3.7.2 Sampling Objectives

The objective of the sampling at the Building 459 site is to define the full extent of contaminant migration in the subsurface media from past operations. Ground water samples from existing monitoring wells will be analyzed and this data will be used for designing the locations of proposed borings and wells, discussed in Sections 3.7.5 and 3.7.6. The types of samples to be collected and analyses to be performed have been developed using information gathered during the March, 1988 site visit, review of existing reports, and review of the comments and concerns of the EPA and DHS. The proposed sampling and analyses for Building 459 can be seen in Table 3.7.1.

3.7.3 Site 459 Reconnaissance

The objectives of the Building 459 reconnaissance are to locate the boundaries of the underground storage tanks and the fuel lines leading from the tanks to the gas pumps. The locations of the underground storage tanks and associated fuel lines will be determined by visual observation of surface as-built construction features, reviewing site utility plans, using an underground utility locator company and/or surface geophysics. One or a combination of these methods will likely be utilized. In addition, the 50-foot soil gas grid should be laid out to maximize sampling and minimize the disruption of normal traffic.

For a general overview of site reconnaissance procedures and further objectives, refer to Section 2.2.

3.7.4 Soil Gas Monitoring Survey

Soil gas monitoring will be used to define the petroleum hydrocarbon contaminant plume and to determine the optimal placement of proposed monitoring wells and/or soil borings (Figures 3.7.2 and 3.7.3) in the Building 459 area. A sampling grid with intervals of 50 feet will be established during the site reconnaissance phase of the investigation (Figure 3.7.2).

3.7.5 Soil Sampling

Figure 3.7.1 shows all subsurface utilities and obstructions identified at the Building 459 site during review of Navy maps and documents. Figure 3.7.3 illustrates the proposed soil boring locations for this area. The actual boring locations will be determined by field personnel after all the utilities and obstructions shown in Figure 3.7.1 have been identified and located.

All relevant regulatory agencies will be notified before borings are begun. All preparation work at each site (see Site Reconnaissance section) must be completed before field sampling can begin.

Surface soil samples will be collected at the location of each soil boring prior to set-up of the drilling equipment. Soil borings will be advanced to a depth of 15 feet. Continuous soil samples will be collected from each boring and borings will be lithologically logged. Split spoon samplers will be used to collect soil samples for contaminant analyses. Split spoon and/or thin-walled tube samplers will be used to collect undisturbed soil samples for physical property analyses. The type and number of soil samples to be collected from each boring is presented in Table 3.7.2. The order in which these samples are collected from a boring is left to the discretion of the field personnel. The types of analyses to be performed on soil samples is presented in Table 3.7.1. All borings not designated for monitoring well installation will be backfilled with cement/bentonite grout and where appropriate, capped with either an asphalt or concrete patch. Soil sample collection methods have been described in Section 2. Refer to Section 5.3.2 of the QAPP for specific information regarding the collection of samples and the decontamination of equipment.

3.7.6 Monitoring Well Installation

Table 3.7.2 and Figure 3.7.3 indicate the borings in which monitoring wells will be installed. These wells will be installed to allow the continual monitoring of ground water levels and to facilitate the collection of ground water samples.

Figure 2.4 is a generalized well construction diagram. Specific well construction procedures will be outlined in Section 4.5 of the QAPP. The actual depth of screen placement will be determined in the field.

3.7.7 Ground Water Sampling

Ground water samples will initially be collected from existing monitoring wells prior to installation of the proposed wells. Ground water samples will be collected from the wells listed in Table 3.7.2. These samples will be analyzed for the parameters listed in Table 3.7.1. The analytical results of these samples will be evaluated to determine if any contamination is present in the ground water in this area.
Ground water samples will be collected from the monitoring wells shown in Figure 3.7.3 after the wells have been installed, developed, and allowed a sufficient recovery time. Floating product layers and thicknesses will also be determined. Sampling will also include the existing wells at the site. Water level measurements will be taken and recorded at each well prior to purging and sampling. A sufficient number of water samples will be collected to allow for the analyses of the ground water parameters listed on Table 3.7.1. Refer to Section 5.3.3 of the QAPP for information

regarding well purging and sample collection procedures. The types of samples to be collected and the preservation method for these samples are also listed in Section 5.3.3 of the QAPP.

3.8 Building 547 (Service Station) Site Investigation Work Plan

3.8.1 Site Specific Conditions

3.8.1.1 General Description and Current Conditions

Building 547 is an on-base annex service station, also accessible from outside the base. It is located midway between the east and south gates, on the perimeter of the base, and was constructed in 1971 (Figure 3.8.1). Currently, the annex station is not in operation, as a result of a possible tank rupture. Tanks were tested and found to be sound. Feed lines were leaking and were dug up and replaced. There are three 12,000-gallon subsurface fiberglass tanks on the site, which were installed in 1971. In addition, there are two stainless steel waste oil tanks located on the northwestern corner of Building 547. One has a 5,000 gallon capacity, the other a 10,000 gallon capacity.

3.8.1.2 Site History

As previously mentioned, one of the 12,000-gallon fiberglass tanks at Building 547 was ruptured in 1980 when a measuring dipstick was dropped into the bottom of the tank. Reportedly, the tank was repaired between 1980 and 1987. No records documenting the tank repair are available. It was assured at the time of rupture that water infiltrated the tank, rather than gasoline escaping, since the tank was below the water table.

After tank testing was conducted in 1988 the tank fuel from the ruptured tank was removed. No records of the abandonment procedures of this tank are available.

3.8.1.3 Summary of Previous Site Investigations

Building 547 was included in the NAS Alameda tank testing survey, conducted by Environmental Resources Management in 1987. Two of the tanks were discovered to have plumbing leaks (ERM-West, 1987).

3.8.2 Sampling Objectives

The objective of the sampling at the Building 547 sampling plan is to define if contamination has been introduced into the subsurface from surface spills or from leaks in the subsurface sewer system. The types of samples to be collected and analyses to be performed have been developed on the basis of information gathered during the March, 1988 site visit, review of existing reports, and review of the comments and concerns of the EPA and DHS. The proposed sampling and analyses for Building 547 along with the rationale for the analyses can be seen in Table 3.8.1.

3.8.3 Site 547 Reconnaissance

The objectives of the Building 547 reconnaissance are to locate the boundaries of the underground storage tanks and the fuel lines leading from the tanks to the gas pumps. The boring and monitoring well position shown in Figure 3.8.3 are examples of location selections that should be used for the site 547 tank and fuel line location. Designated boring and well locations will be based on the actual tank and fuel line locations. The 50-foot soil gas grid will be laid out at this time to maximize sampling and minimize disruption of daily traffic.

For a general overview of site reconnaissance procedures and further objectives, refer to Section 2.2.

3.8.4 Soil Gas Monitoring Survey

Soil gas monitoring will be used to define the petroleum hydrocarbon contaminant plume and to determine the optimal placement of proposed monitoring wells and/or soil borings (Figures 3.8.2 and 3.8.3) in the Building 547 area. A 50-foot sampling grid will be established during the site reconnaissance phase of the investigation (Figure 3.8.2).

3.8.5 Soil Sampling

Figure 3.8.1 shows all subsurface utilities and obstructions identified at the Building 547 site during review of Navy maps and documents. Figure 3.8.3 illustrates the proposed soil boring locations for this area. The actual boring locations will be determined by field personnel after all the utilities and obstructions shown in Figure 3.8.1 have been identified and located.

All relevant regulatory agencies will be notified before borings are begun. All preparation work at each site (see Site Reconnaissance section) must be completed before field sampling can begin.

Surface soil samples will be collected at the location of each soil boring prior to set-up of the drilling equipment. Soil borings will be advanced to a depth of 15 feet. Continuous soil samples will be collected from each boring, and borings will be lithologically logged. Split spoon samplers will be used to collect soil samples for contaminant analyses. Split spoon and/or thin-walled tube samplers will be used to collect undisturbed soil samples for physical property analyses. The type and number of soil samples to be collected from each boring is presented in Table 3.8.2. The order in which these samples are collected from a boring is left to the discretion of the field personnel. The types of analyses to be performed on soil samples is presented in Table 3.8.1. All borings not designated for monitoring well installation will be backfilled with cement/bentonite grout and where appropriate, capped with either an asphalt or concrete patch. Soil sample collection methods have been described in Section 2. Refer to Section 5.3.2 of the QAPP for specific information regarding the collection of samples and the decontamination of equipment.

3.8.6 Monitoring Well Installation

Table 3.8.2 and Figure 3.8.3 indicate the borings in which monitoring wells will be installed. These wells will be installed to allow the continual monitoring of ground water levels and to facilitate the collection of ground water samples.

Figure 2.4 is a generalized well construction diagram. Specific well construction procedures will be outlined in Section 4.5 of the QAPP. The actual depth of screen placement will be determined in the field.

3.8.7 Ground Water Sampling

Ground water samples will be collected from the monitoring wells listed in Table 3.8.2. These samples will be analyzed for the parameters listed in Table 3.8.1. The analytical results of these samples will be evaluated to determine if any contamination is present in the ground water in this area.

Ground water samples will be collected from the monitoring wells shown in Figure 3.8.3 after the wells have been installed, developed, and allowed a sufficient recovery time. Floating product layers and thicknesses will also be determined. Sampling will also include the existing wells at the site. Water level measurements will be taken and recorded at each well prior to purging and sampling. A sufficient number of water samples will be collected to allow for the analyses of the ground water parameters listed on Table 3.8.1. Refer to Section 5.3.3 of the QAPP for information regarding well purging and sample collection procedures. The types of samples to be collected and the preservation method for these samples are also listed in Section 5.3.3 of the QAPP.

3.9 Building 162 (Service Station) Site Investigation Work Plan

3.9.1 Site Specific Conditions

3.9.1.1 General Description and Current Conditions

Building 162 occupies an area formerly used by the Navy Exchange as a service station (Figure 3.9.1). No information could be located as to the presence of subsurface tanks, and no evidence could be located during a site visit in March, 1988 to suggest the presence of any tanks.

3.9.1.2 Site History

Despite numerous discussions with NAS Alameda personnel and record reviews, no information has been located describing the presence of underground storage tanks at Building 162 (former location of a Navy Exchange Service Station). No geophysical techniques have been used to locate underground storage tanks at this site. In addition, ERM-West did not conduct an underground tank search at this site in 1987. Possibly only administrative activities by the Naval Exchange occurred at this site.

3.9.1.3 Summary of Previous Site Investigations

Historical information relating to Building 162 is virtually nonexistent. As stated in the IAS, any leakage that might have occurred at this site in the past, would in all likelihood be obscured by the more recent and sizeable loss of AVGAS from Area 97. Contamination of this area will, therefore, be characterized as part of the Area 97 investigation.

3.9.2 Sampling Objectives

The objective of the Building 162 sampling plan is to determine if contamination has been introduced into the subsurface from surface spills or from leaks in the subsurface sewer system. The types of samples to be collected and the analyses to be performed have been developed on the basis of information gathered during the March, 1988 site visit, review of existing reports, and review of the comments and concerns of the EPA and DHS.

Sampling locations to be used for the characterization of contamination from the service station previously located at the Building 162 site are Borings 14-2 (MW 14-2), 14-3, 97-3 (MW 97-3), OW-21, OW-2, and WA-8 (Figure 3.9.2).

The proposed sample types and analyses for Building 162 along with the rationale for the analyses can be seen in Table 3.9.1.

3.9.3 Site Reconnaissance

Refer to the Building 14 and Area 97 site reconnaissance sections, as well as Section 2.2.

3.9.4 Soil Sampling

Figure 3.9.1 shows all subsurface utilities and obstructions identified at Building 162 during review of Navy maps and documents. Figure 3.9.2 illustrates the proposed soil boring locations included in this study. The actual boring locations will be determined by field personnel after all the utilities and obstructions shown in Figure 3.9.1 have been identified and located.

All relevant regulatory agencies will be notified before borings are begun. All preparation work at each site (see Site Reconnaissance section) must be completed before field sampling can begin.

Surface soil samples will be collected at the location of each soil boring prior to set-up of the drilling equipment. Soil borings will be advanced to a depth of 15 feet. Continuous soil samples will be collected from each boring, and borings will be lithologically logged. Split spoon samplers will be used to collect soil samples for contaminant analyses. Split spoon and/or thin-walled tube samplers will be used to collect undisturbed soil samples for physical property analyses. The type and number of soil samples to be collected from each boring is presented in Table 3.9.2. The order in which these samples are collected from a boring is left to the discretion of the field personnel. The types of analyses to be performed on soil samples is presented in Table 3.9.1.

All borings not designated for monitoring well installation will be backfilled with cement/bentonite grout and where appropriate, capped with either an asphalt or concrete patch.

Soil sample collection methods have been described in Section 2. Refer to Section 5.3.2 of the QAPP for specific information regarding the collection of samples and the decontamination of equipment.

3.9.5 Monitoring Well Installation

Table 3.9.2 and Figure 3.9.2 indicate the borings in which monitoring wells will be installed. These wells will be installed to allow the continual monitoring of ground water levels and to facilitate the collection of ground water samples.

Figure 2.4 is a generalized well construction diagram. Specific well construction procedures will be outlined in Section 4.5 of the QAPP. The actual depth of screen placement will be determined in the field.

3.9.6 Ground Water Sampling

Ground water samples will be collected from the wells listed in Table 3.9.2. These samples will be analyzed for the parameters listed in Table 3.9.1. The analytical results of these samples will be evaluated to determine if any contamination is present in the ground water in this area.

Ground water samples will be collected from the wells shown in Figure 3.9.2. These will include wells installed during the 1980 and 1985 investigations. Water level measurements will be taken and recorded at each well prior to purging and sampling. A sufficient number of water samples will be collected to allow for the analyses of the ground water parameters listed on Table 3.9.1. Refer to Section 5.3.3 of the QAPP for information regarding well purging and sample collection procedures. The types of samples to be collected and the preservation method for these samples are also listed in Section 5.3.3 of the QAPP.

3.10 Building 114 (Pest Control Area and Separator Pit) Site Investigation Work Plan

3.10.1 Site Specific Conditions

3.10.1.1 General Description and Current Conditions

Building 114 is located approximately 1/3-mile south of the main gate on Avenue C between Third and Fourth Streets (Figure 3.10.1). The western end of the building is currently used for administrative purposes, while the eastern portion continues to house Public Works Center activities. An outside shed along the northeast corner of the south wing of Building 114 is used for storing pesticides. A number of maintenance activities, including a paint shop, are still in operation at Building 114.

3.10.1.2 Site History

Building 114 has previously housed the majority of Public Works' shops including woodworking, painting, and steam cleaning. The building also served as the pesticide and herbicide storage and operations area for the base. Steam cleaning, paint stripping, and paint spray booth activities generated approximately 250 gallons of wastewater per day, which was discharged directly to storm drains. Ultimately, the drains emptied into the San Francisco Bay via the Seaplane Lagoon. A separator pit, located in the western corner of Building 114 courtyard, was intended to separate sludges and floating scums from the wastewater stream; however, this system is known to have operated inadequately (E&E, 1983). Periodically, the separator pit was pumped out and the contents disposed of at the West Beach Landfill.

Prior to 1974, Building 114 was the center for weed control on the base. Materials were stored at Building 114 and equipment was rinsed in the yard. Pesticides used included chlordane, lindane, DDT, malathion and diazinon. Herbicides included Telvar, Chlorvar, 2,4-D, Roundup, Princep, and KrovarI. In 1974, the Public Works Center shifted operations to the Oakland Naval Supply Center; however, the same personnel, equipment and facilities are still used at Building 114 (E&E, 1983).

3.10.1.3 Summary of Previous Site Investigation

No characterization of potential contamination resulting from Building 114 operations has been made. There exists a need to determine whether ground water and soil have been contaminated, and whether the separator pit contains residual contaminants.

3.10.2 Sampling Objectives

The objective of the Building 114 sampling plan is to determine if contamination has been introduced into the subsurface from surface spills or from leaks in the subsurface sewer system. The types of samples to be collected and the analyses to be performed have been developed on the basis of information gathered during the March, 1988 site visit, review of existing reports, and review of the comments and concerns of the EPA and DHS.

Soil borings will be advanced in the central courtyard area (Figure 3.10.2) to determine if any contaminants are present in the subsurface environment. Contamination may be present due to the result of releases from the oil/grease separator pit located in this area, and from surface runoff of painting and stripping activities which occurred in the courtyard area.

Soil borings will be advanced around the perimeter of the building near the junction points of sewers which received effluent from these areas (Figure 3.10.2) because these junctions would be more likely to leak and, because waste may be more prone to pool at elbow and T-joints where the soil has been excavated to a greater depth. Monitoring wells will be installed (Figure 3.10.2) to allow the monitoring of water levels and to facilitate the sampling of ground water. The ground water samples will be analyzed to determine if contaminants are present in the ground water found in this area. Water level measurements will be used to help determine the flow patterns of ground water at the NAS Alameda area.

The proposed sample types and analyses for Building 547 along with the rationale for the analyses can be seen in Table 3.10.1.

3.10.3 Site Reconnaissance

See Section 2.2

3.10.4 Soil Sampling

Figure 3.10.1 shows all subsurface utilities and obstructions identified at Building 114 during review of Navy maps and documents. Figure 3.10.2 illustrates the proposed soil boring locations for this area. The actual boring locations will be determined by field personnel after all the utilities and obstructions shown in Figure 3.10.1 have been identified and located.

All relevant regulatory agencies will be notified before borings are begun. All preparation work at each site (see Site Reconnaissance section) must be completed before field sampling can begin.

Surface soil samples will be collected at the location of each soil boring prior to set-up of the drilling equipment. Soil borings will be advanced to a depth of 15 feet. Continuous soil samples will be collected from each boring, and borings will be lithologically logged. Split spoon samplers will be used to collect soil samples for contaminant analyses. Split spoon and/or thin-walled tube samplers will be used to collect undisturbed soil samples for physical property analyses. The type and number of soil samples to be collected from each boring is presented in Table 3.10.2. The order in which these samples are collected from a boring is left to the discretion of the field personnel. The types of analyses to be performed on soil samples is presented in Table 3.10.1.

All borings not designated for monitoring well installation will be backfilled with cement/bentonite grout and where appropriate, capped with either an asphalt or concrete patch. Soil sample collection methods have been described in Section 2. Refer to Section 5.3.2 of the QAPP for specific information regarding the collection of samples and the decontamination of equipment.

3.10.5 Monitoring Well Installation

Table 3.10.2 and Figure 3.10.2 indicate the borings in which monitoring wells will be installed. These wells will be installed to allow the continual monitoring of ground water levels and to facilitate the collection of ground water samples.

Figure 2.4 is a generalized well construction diagram. Specific well construction procedures will be outlined in Section 4.5 of the QAPP. The actual depth of screen placement will be determined in the field.

3.10.6 Ground Water Sampling

Ground water samples will be collected from the wells listed in Table 3.10.2. These samples will be analyzed for the parameters listed in Table 3.10.1. The analytical results of these samples will be evaluated to determine if any contamination is present in the ground water in this area.

Ground water samples will be collected from the monitoring wells after each well has been installed, developed, and allowed a sufficient recovery time. Water level measurements will be taken and recorded at each well prior to purging and sampling. A sufficient number of water samples will be collected to allow for the analysis of the ground water parameters listed on Table 3.10.1. Refer to Section 5.3.3. of the QAPP for information regarding well purging and sample collection procedures. The types of samples to be collected and the preservation method for these samples are also listed in Section 5.3.3 of the QAPP.

3.11 Building 410 Site Investigation Work Plan

3.11.1 Site Specific Conditions

3.11.1.1 General Description and Current Conditions

Building 410 is located approximately 1/3-mile west of the south gate on Eighth Street between Avenues L and M (Figure 3.11.1). The building houses the aircraft paint stripping operation for NAS Alameda. All wastes resulting from this area are attributable to the paint stripping process. Wastewaters contain high concentrations of oil, paint, paint skins, detergent and stripper. During a site visit conducted in March 1988, strong phenolic odors could be detected outside the building during paint stripping operations.

The wastewaters, high in chromium, phenols and methylene chloride, are discharged to the Building 410 Industrial Waste Treatment Facility (IWTF) and then to the Building 25 IWTF, entering the POTW. Prior to October, 1987, the wastewater from the Building 410 IWTF was discharged directly to the industrial wastewater collection system.

3.11.1.2 Site History

The Industrial Waste Treatment facility was constructed at Building 410 in 1973. Prior to its existence, all wastewater from the paint stripping operations was discharged directly to the industrial wastewater collection system without treatment.

3.11.1.3 Summary of Previous Site Investigations

Composite analyses were performed on Building 410 wastewater in 1981 as part of the NARF Industrial Waste Survey. Results of these analyses, presented in the Initial Assessment Study (E&E, 1983), indicated high chromium, phenol, surfactants, total solids, BOD and COD.

3.11.2 Sampling Objectives

The objectives of the Building 410 sampling plan is to determine if contamination has been introduced to the subsurface from surface spills or leaks in the subsurface sewer system. The site will be visually inspected for evidence of surface spills and releases. Any surface areas exhibiting evidence of gross surface contamination will be investigated.

The potential for contamination exists in several key areas at Building 410. These are: above-ground tanks on the north side of the building; sewers on the north side of the building which appear contaminated; a concrete slab inside the building with floor drains to collect paint stripping fluid; a small fenced chemical waste storage area at the south side of the building; and a concrete area containing drains on the east side of the building. Therefore, both soil borings and monitoring wells will be constructed to examine the extent of contamination resulting from past activities in these areas.

Soil borings will be advanced around the perimeter of the building near sewer junction points (Figure 3.11.2) on the basis that these junctions would be more likely to leak, and because waste may be more prone to pool at elbow and T-joints where the soil has been excavated to a greater depth.

Monitoring wells will be installed (Figure 3.11.2) to allow the monitoring of water levels and to facilitate the sampling of ground water. The ground water samples will be analyzed to determine if contaminants are present in the ground water found in this area. Water level measurements will be used to help determine the flow patterns of ground water at the NAS Alameda area.

The types of samples to be collected at Building 410, the types of analyses to be performed on these samples, and the rationale for this collection and analysis program can be seen in Table 3.11.1.

A site-specific and analytical sampling plan has been developed for the Building 410 area. The types of samples to be collected and analyses to be performed have been developed using information gathered during the site visit, review of existing reports, and comments and concerns of the EPA and DHS.

3.11.3 Site Reconnaissance

See Section 2.2.

3.11.4 Soil Sampling

Figure 3.11.1 shows all subsurface utilities and obstructions identified at Building 410 during review of Navy maps and documents. Figure 3.11.2 illustrates the proposed soil boring locations for this area. The actual boring locations will be determined by field personnel after all the utilities and obstructions shown in Figure 3.11.1 have been identified and located.

All relevant regulatory agencies will be notified before borings are begun. All preparation work at each site (see Site Reconnaissance section) must be completed before field sampling can begin.

Surface soil samples will be collected at the location of each soil boring prior to the set-up of the drilling equipment. Soil borings will be advanced to a depth of 15 feet. Continuous soil samples will be collected from each boring, and borings will be lithologically logged. Split spoon samplers will be used to collect soil samplers for contaminant analyses. Split spoon and/or thin-walled tube samplers will be used to collect undisturbed soil samples for physical property analyses. The type and number of soil samples to be collected from each boring is presented in Table 3.11.2. The order in which these samples are collected from a boring is left to the discretion of the field personnel. The types of analyses to be performed on soil samples is presented in Table 3.11.1.

All borings not designated for monitoring well installation will be backfilled with cement/bentonite grout and where appropriate, capped with either an asphalt or concrete patch. Soil sample collection methods have been described in Section 2. Refer to Section 5.3.2 of the QAPP for specific information regarding the collection of samples and the decontamination of equipment.

3.11.5 Monitoring Well Installation

Table 3.11.2 and Figure 3.11.2 indicate the borings in which monitoring wells will be installed. These wells will be installed to allow the continual monitoring of ground water levels and to facilitate the collection of ground water samples.

Figure 2.4 is a generalized well construction diagram. Specific well construction procedures will be outlined in Section 4.5 of the QAPP. The actual depth of screen placement will be determined in the field.

3.11.6 Ground Water Sampling

Ground water samples will be collected from the wells listed in Table 3.11.2. These samples will be analyzed for the parameters listed in Table 3.11.1. The analytical results of these samples will be evaluated to determine if any contamination is present in the ground water in this area. Ground water samples will be collected from the monitoring wells after the well has been installed, developed, and allowed a sufficient recovery time. Water level measurements will be taken and recorded at each well prior to purging and sampling. A sufficient number of water samples will be collected to allow for the analysis of the ground water parameters listed on Table 3.11.1. Refer to Section 5.3.3 of the QAPP for information regarding well purging and sample collection procedures. The types of samples to be collected and the preservation method for these samples are also listed in Section 5.3.3 of the QAPP.

3.12 Building 530 (Missile Rework Operations) Site Investigation Work Plan

3.12.1 Site Specific Conditions

3.12.1.1 General Description and Current Conditions

Building 530 is located immediately west of the south gate and is the current site for missile rework operations (Figure 3.12.1). Activities include electrical maintenance; cleaning; grinding; welding; paint stripping and painting; and fabricating. Current waste handling procedures at Building 530 are tightly controlled, with all wastes and paint stripping baths disposed of off-site in 55-gallon drums.

3.12.1.2 Site History

Missile rework operations have been conducted in Building 530 since 1972.

3.12.1.3 Summary of Previous Site Investigations

No previous sampling of environmental media or wastewaters has been performed at Building 530. However, based on information generated by wastewater sampling at Building 5 (E&E, 1983) and a site inspection, waste water constituents are assumed consistent at Building 530. The main characteristics of the waste water constituents are high levels of solvents, heavy metals, and phenols (E&E, 1983).

3.12.2 Sampling Objectives

The objective of the Building 530 sampling plan is to determine if contamination has been introduced to the subsurface from surface spills or leaks in the subsurface sewer system. The site will be visually inspected for evidence of surface spills and releases. Any surface areas exhibiting evidence of gross surface contamination will be investigated.

Soil borings will be advanced around the perimeter of the building near junction points of sewers which received effluent from these areas (Figure 3.12.2) on the basis that these junctions would be more likely to leak, and because waste may be more prone to pool at elbow and T-joints where the soil has been excavated to a greater depth.

Monitoring wells will be installed (Figure 3.12.2) to allow the monitoring of water levels and to facilitate the sampling of ground water. The ground water samples will be analyzed to determine if contaminants are present in the ground water found in this area. Water level measurements will be used to help determine the flow patterns of ground water at the NAS Alameda area.

A site-specific and analytical sampling plan has been developed for the Building 530 site area. The types of samples to be collected and analyses to be performed have been developed using information gathered during the March, 1988 site visit, review of existing reports, and comments and concerns of the EPA. The sampling and analysis plan for Building 530 can be seen in Table 3.12.1.

3.12.3 Site Reconnaissance

See Section 2.2.

3.12.4 Soil Sampling

Figure 3.12.1 shows all subsurface utilities and obstructions identified at Building 530 during review of Navy maps and documents. Figure 3.12.2 illustrates the proposed soil boring locations for this area. The actual boring locations will be determined by field personnel after all the utilities and obstructions shown in Figure 3.12.1 have been identified and located.

All relevant regulatory agencies will be notified before borings are begun. All preparation work at each site (see Site Reconnaissance section) must be completed before field sampling can begin.

Surface soil samples will be collected at the location of each soil boring prior to set-up of the drilling equipment. Soil borings will be advanced to a depth of 15 feet. Continuous soil samples will be collected from each boring, and borings will be lithologically logged. Split spoon samplers will be used to collect soil samples for contaminant analyses. Split spoon and/or thin-walled tube samplers will be used to collect undisturbed soil samples for physical property analyses. The type and number of soil samples to be collected from each boring is presented in Table 3.12.2. The order in which these samples are collected from a boring is left to the discretion of the field personnel. The types of analyses to be performed on soil samples is presented in Table 3.12.1. All borings not designated for monitoring well installation will be backfilled with cement/bentonite grout and where appropriate, capped with either an asphalt or concrete patch.

Soil sample collection methods have been described in Section 2. Refer to Section 5.3.2 of the QAPP for specific information regarding the collection of samples and the decontamination of equipment.

3.12.5 Monitoring Well Installation

Table 3.12.2 and Figure 3.12.2 indicate the borings in which monitoring wells will be installed. These wells will be installed to allow the continual monitoring of ground water levels and to facilitate the collection of ground water samples.

Figure 2.4 is a generalized well construction diagram. Specific well construction procedures will be outlined in Section 4.5 of the QAPP. The actual depth of screen placement will be determined in the field.

3.12.6 Ground Water Sampling

Ground water samples will be collected from the wells listed in Table 3.12.2. These samples will be analyzed for the parameters listed in Table 3.12.1. The analytical results of these samples will be evaluated to determine if any contamination is present in the ground water in this area.

Ground water samples will be collected from the monitoring wells after the wells have been installed, developed, and allowed a sufficient recovery time. Floating product layers and thicknesses will also be determined.

Water level measurements will be taken and recorded at each well prior to purging and sampling. A sufficient number of water samples will be collected to allow for the analyses of the ground water parameters listed on Table 3.12.1. Refer to Section 5.3.3 of the QAPP for information regarding well purging and sample collection procedures. The types of samples to be collected and the preservation method for these samples are also listed in Section 5.3.3 of the QAPP.

3.13 Building 400 (Missile Rework Operations) Site Investigation Work Plan

3.13.1 Site Specific Conditions

3.13.1.1 General Description and Current Conditions

Building 400, located on Avenue F at the northwestern corner of the Seaplane Lagoon, is the former site of missile rework operations (Figure 3.13.1). Building 400 currently houses a small paint stripping and fiberglass operation and aircraft parts' cleaning area. Waste handling procedures are consistent with those of Building Nos. 5, 360, and 410.

3.13.1.2 Site History

Missile rework operations were shifted from Building 400 to Building 530 in 1972. Wastes generated at Building 400 prior to 1972 included paint sludges, metal shavings, paint strippers, cleaning solvents (trichloroethene and carbon tetrachloride), testing fluids, and miscellaneous waste oils and grease. These wastes were disposed of in the West Beach Landfill. Wastewaters resulting from operations were discharged to the industrial waste collection system. As with wastewater and rinse water from Building Nos.5, 360, and 410, no pre-treatment was occurring at that time.

3.13.1.3 Summary of Previous Site Investigations

No previous sampling of environmental media or wastewaters has been performed at Building 400. However, based on information generated by wastewater sampling at Building 5 (E&E, 1983) and a site inspection, wastewater constituents are assumed consistent at Building 400. The main characteristics include high levels of solvents, heavy metals, and phenols (E&E, 1983).

3.13.2 Sampling Objectives

The objective of the Building 400 sampling plan is to determine if contamination has been introduced to the subsurface from surface spills or leaks in the subsurface sewer system. The site will be visually inspected for evidence of surface spills and releases. Any surface areas exhibiting evidence of gross surface contamination will be investigated.

Soil borings will be advanced around the perimeter of the building near junction points of sewers which received effluent from these areas (Figure 3.13.2) on the basis that these junctions would be more likely to leak, and because waste may be more prone to pool at elbow and T-joints where the soil has been excavated to a greater depth.

Monitoring wells will be installed (Figure 3.13.2) to allow the monitoring of water levels and to facilitate the sampling of ground water. The ground water samples will be analyzed to determine if contaminants are present in the ground water found in this area. Water level measurements will be used to help determine the flow patterns of ground water at the NAS Alameda area.

A site-specific and analytical sampling plan has been developed for the Building 400 site area. The types of samples to be collected and analyses to be performed have been developed using information gathered during the site visit, review of existing reports, and comments and concerns of the EPA.

The sampling and analyses plan for Building 400 can be seen in Table 3.13.1.

3.13.3 Soil Reconnaissance

See Section 2.2.

3.13.4 Soil Sampling

Figure 3.13.1 shows all subsurface utilities and obstructions identified at Building 400 during review of Navy maps and documents. Figure 3.13.2 illustrates the proposed soil boring locations for this area. The actual boring locations will be determined by field personnel after all the utilities and obstructions shown in Figure 3.13.1 have been identified and located.

All relevant regulatory agencies will be notified before borings are begun. All preparation work at each site (see Site Reconnaissance section) must be completed before field sampling can begin.

Surface soil samples will be collected at the location of each soil boring prior to set-up of the drilling equipment. Soil borings will be advanced to a depth of 15 feet. Continuous soil samples will be collected from each boring, and borings will be lithologically logged. Split spoon samplers will be used to collect soil samples for contaminant analyses. Split spoon and/or thin-walled tube samplers will be used to collect undisturbed soil samples for physical property analyses. The type and number of soil samples to be collected from each boring is presented in Table 3.13.2. The order in which these samples are collected from a boring is left to the discretion of the field personnel. The types of analyses to be performed on soil samples is presented in Table 3.13.1. All borings not designated for monitoring well installation will be backfilled with cement/bentonite grout and where appropriate, capped with either an asphalt or concrete patch.

Soil sample collection methods have been described in Section 2. Refer to Section 5.3.2 of the QAPP for specific information regarding the collection of samples and the decontamination of equipment.

3.13.5 Monitoring Well Installation

Table 3.13.2 and Figure 3.13.2 indicate the borings in which monitoring wells will be installed. These wells will be installed to allow the continual monitoring of ground water levels and to facilitate the collection of ground water samples.

Figure 2.4 is a generalized well construction diagram. Specific well construction procedures will be outlined in Section 4.5 of the QAPP. The actual depth of screen placement will be determined in the field.

3.13.6 Ground Water Sampling

Ground water samples will be collected from the wells listed in Table 3.13.2. These samples will be analyzed for the parameters listed in Table 3.13.1. The analytical results of these samples will be evaluated to determine if any contamination is present in the ground water in this area. Ground water samples will be collected from the monitoring wells after the wells have been installed, developed, and allowed a sufficient recovery time. Water level measurements will be taken and recorded at each well prior to purging and sampling. A sufficient number of water samples will be collected to allow for the analyses of the ground water parameters listed on Table 3.13.1. Refer to Section 5.3.3 of the QAPP for information regarding well purging and sample collection procedures. The types of samples to be collected and the preservation method for these samples are also listed in Section 5.3.3 of the QAPP.

3.14 Building 14 (Test Shop) Site Investigation Work Plan

3.14.1 Site Specific Conditions

3.14.1.1 General Description and Current Conditions

Building 14 is located on Fifth Street, adjacent to the eastern side of the Seaplane Lagoon (Figure 3.14.1). The building currently houses two active engine testing chambers, the remainder are inoperative. The second floor of the building is occupied by a number of laboratories which appear to use small quantities of mercury in manometers and thermometers. Instrumentation in the laboratory is relatively new and no recent mercury spills were reported during a site investigation conducted in March, 1988. No visible signs of mercury contamination were apparent in either the laboratories or areas below them.

3.14.1.2 Site History

Building 14 served as the primary area for aircraft engine testing until a more modern facility was constructed elsewhere on the base. This building was constructed in 1946 and was used for propeller testing during the 1950s and for jet engine testing during the 1970s. Fuel types used during testing included AVGAS, JP-5 (jet fuel), and JP-7. The fuel was supplied from the fuel farm. Fuel lines extend underground from the fuel farm and connect to the rooftop in Building 14. No hydraulic fluid was used during testing. However, several solvents were used to cleanup, including PD-680 and BNB 3100. Other general purpose chemicals used to clean the engine and spills include catane, 10-10 oil, lubrication oil and synthetics.

Laboratories located on the second floor have reportedly contained mercury in various devices for many years. Minor spills, amounts of several ounces, have occurred in the past which may have been washed into the industrial waste collection system. Spills that were cleaned up resulted in contaminated materials that were disposed of at the West Beach Landfill and 1943-1956 Disposal Area. The site inspection and interviews revealed that the earlier mercury spills generally amounted to self-contained overflows within instrument measuring devices. The area of potential contamination is about 4 square feet on the second floor. However, because there are indications that mercury may have been washed into the industrial waste collection system, investigation of possible mercury leaks from this sewer system has been recommended by DHS.

3.14.1.3 Summary of Previous Site Investigations

No sampling of environmental media or wastewater discharges has been performed at Building 14.

3.14.2 Sampling Objectives

The objective of the Building 14 sampling plan is to determine if contamination including mercury has been introduced into the subsurface from surface spills or from leaks in the subsurface sewer system. The types of samples to be collected and the analyses to be performed have been developed on the basis of information gathered during the March, 1988 site visit, review of existing reports, and review of the comments and concerns of the EPA and DHS.

The proposed sample types and analyses for Building 14 along with the rationale for the analyses can be seen in Table 3.14.1.

3.14.3 Site Reconnaissance

The specific objectives of the Building 14 site reconnaissance are to designate the floor drains that show evidence of gross contamination for investigation, to locate points likely to leak in the drain sewers leaving the building and to define the locations of underground tanks on the southern side of the building. It should be noted that Building 14 will be included in the Area 97 site reconnaissance and subsequent soil gas investigation, as shown on Figures 3.3.1 and 3.14.2. The final sampling locations and analytical results for both study areas should be used in coordination with one another.

For a general overview of the Building 14 site reconnaissance objectives refer to Section 2.2.

3.14.4 Soil Sampling

Figure 3.14.1 shows all subsurface utilities and obstructions identified at the Building 14 site during review of Navy maps and documents. Figure 3.14.2 illustrates the proposed soil boring locations for this area. The actual boring locations will be determined by field personnel after all the utilities and obstructions shown in Figure 3.14.1 have been identified and located.

All relevant regulatory agencies will be notified before borings are begun. All preparation work at each site (see Site Reconnaissance section) must be completed before field sampling can begin.

Surface soil samples will be collected at the location of each soil boring prior to set-up of the drilling equipment. Soil borings will be advanced to a depth of 15 feet. Continuous soil samples will be collected from each boring, and borings will be lithologically logged. Split spoon samplers will be used to collect soil samples for contaminant analyses. Split spoon and/or thin-walled tube samplers will be used to collect undisturbed soil samples for physical property analyses. The type and number of soil samples to be collected from each boring is presented in Table 3.14.2. The order in which these samples are collected from a boring is left to the discretion of the field personnel. The types of analyses to be performed on soil samples is presented in Table 3.14.1. All borings not designated for monitoring well installation will be backfilled with cement/bentonite grout and where appropriate, capped with either an asphalt or concrete patch.

Soil sample collection methods have been described in Section 2. Refer to Section 5.3.2 of the QAPP for specific information regarding the collection of samples and the decontamination of equipment.

3.14.5 Monitoring Well Installation

Table 3.14.2 and Figure 3.14.2 indicate the borings in which monitoring wells will be installed. These wells will be installed to allow the continual monitoring of ground water levels and to facilitate the collection of ground water samples.

Figure 2.4 is a generalized well construction diagram. Specific well construction procedures will be outlined in Section 4.5 of the QAPP. The actual depth of screen placement will be determined in the field.

3.14.6 Ground Water Sampling

Ground water samples will be collected from the wells listed in Table 3.14.2. These samples will be analyzed for the parameters listed in Table 3.14.1. The analytical results of these samples will be evaluated to determine if any contamination is present in the ground water in this area.

Ground water samples will be collected from the monitoring wells after the wells have been installed, developed, and allowed a sufficient recovery time. Floating product layers and thicknesses will also be determined. Water level measurements will be taken and recorded at each well prior to purging and sampling. A sufficient number of water samples will be collected to allow for the analyses of the ground water parameters listed on Table 3.14.1. Refer to Section 5.3.3 of the QAPP for information regarding well purging and sample collection procedures. The types of samples to be collected and the preservation method for these samples are also listed in Section 5.3.3 of the QAPP.

3.15 Building 10 (Power Plant) Site Investigation Work Plan

3.15.1 Site Specific Conditions

3.15.1.1 General Description and Current Conditions

Building 10 is located on Avenue F between Second and Third Streets (Figure 3.15.1). It currently houses seven operative boilers, which are primarily fueled by natural gas; diesel fuel is used for back-up purposes. Nine above-ground diesel tanks, with a total capacity of 158,000 gallons were installed on the south side of the plant over the course of several years between the 1960s and mid 1970s. The area where the tanks are located is bermed, and no incidents of leakage have been documented (E&E, 1983).

3.15.1.2 Site History

Bunker "C" fuel was used at Building 10 until the early 1970's. The fuel was stored in underground tanks located along the northeast side of the building. Spills have occurred in the past, resulting in accumulation of fuel oil in steam pipe trenches on the northern side of the building. Suction trucks skimmed the oil off the surface and disposed of it in the oil sump at the West Beach Landfill (E&E, 1983).

3.15.1.3 Summary of Previous Site Investigations

A tank testing study conducted in 1987 (ERM-West, 1987) discovered five underground tanks at Building 10. Four were reportedly filled with sand and the fifth has been proposed for removal. Approximate locations of these tasks were noted during a recent site visit and are shown on Figure 3.15.2. No sampling of environmental media has been performed in the vicinity of Building 10.

3.15.2 Sampling Objectives

The objectives of the Building 10 sampling plan is to determine if contamination has been introduced to the subsurface. The site will be visually inspected for evidence of surface spills and releases. Any surface areas exhibiting gross surface contamination will be investigated. Subsurface soil and ground water sampling will be targeted at the possibility of bunker "C" oil contamination and releases of boiler blowdown containing caustic soda, phosphate, and sulfide along the sewer line.

Soil borings will be advanced around the perimeter of the building near junction points of sewers which received effluent from these areas (Figure 3.15.2) on the basis that these junctions would be more likely to leak, and because waste may be more prone to pool at elbow and T-joints where the soil has been excavated to a greater depth.

In addition to the building perimeter sampling, it is proposed that soil borings and ground water monitoring wells be placed on the northern side of the building. Known spills of Bunker "C" fuel have occurred and fuel has accumulated in the steam pipe trenches north of the building. In addition, abandoned underground storage tanks are present on the north side of the building.

Monitoring wells will be installed (Figure 3.15.2) to allow the monitoring of water levels and to facilitate the sampling of ground water. The ground water samples will be analyzed to determine if contaminants are present in the ground water found in this area. Water level measurements will be used to help determine the flow patterns of ground water at the NAS Alameda area.

A site-specific and analytical sampling plan has been developed for the Building 10 area. The types of samples to be collected and analyses to be performed have been developed using information gathered during the site visit, review of existing reports, and comments and concerns of the DHS.

The sampling and analyses plan for Building 10 can be seen in Table 3.15.1.

3.15.3 Site Reconnaissance

See Section 2.2.

3.15.4 Soil Sampling

Figure 3.15.1 shows all subsurface utilities and obstructions identified at Building 10 during review of Navy maps and documents. Figure 3.15.2 illustrates the proposed soil boring locations for this area. The actual boring locations will be determined by field personnel after all the utilities and obstructions shown in Figure 3.15.1 have been identified and located.

All relevant regulatory agencies will be notified before borings are begun. All preparation work at each site (see Site Reconnaissance section) must be completed before field sampling can begin.

Surface soil samples will be collected at the location of each soil boring prior to set-up of the drilling equipment. Soil borings will be advanced to a depth of 15 feet. Continuous soil samples will be collected from each boring and borings will be lithologically logged. Split spoon samplers will be used to collect soil samples for contaminant analyses. Split spoon and/or thin-walled tube samplers will be used to collect undisturbed soil samples for physical property analyses. The type and number of soil samples to be collected from each boring is presented in Table 3.15.2. The order in which these samples are collected from a boring is left to the discretion of the field personnel. The types of analyses to be performed on soil samples is presented in Table 3.15.1. All borings not designated for monitoring well installation will be backfilled with cement/bentonite grout and where appropriate, capped with either an asphalt or concrete patch.

Soil sample collection methods have been described in Section 2. Refer to Section 5.3.2 of the QAPP for specific information regarding the collection of samples and the decontamination of equipment.

3.15.5 Monitoring Well Installation

Table 3.15.2 and Figure 3.15.2 indicate the borings in which monitoring wells will be installed. These wells will be installed to allow the continual monitoring of ground water levels and to facilitate the collection of ground water samples.

Figure 2.4 is a generalized well construction diagram. Specific well construction procedures will be outlined in Section 4.5 of the QAPP. The actual depth of screen placement will be determined in the field.

3.15.6 Ground Water Sampling

Ground water samples will be collected from the wells listed in Table 3.15.2. These samples will be analyzed for the parameters listed in Table 3.15.1. The analytical results of these samples will be evaluated to determine if any contamination is present in the ground water in this area.

Ground water samples will be collected from the monitoring wells after the wells have been installed, developed, and allowed a sufficient recovery time. Water level measurements will be taken and recorded at each well prior to purging and sampling. A sufficient number of water samples will be collected to allow for the analyses of the ground water parameters listed on Table 3.15.1. Refer to Section 5.3.3 of the QAPP for information regarding well purging and sample collection procedures. The types of samples to be collected and the preservation method for these samples are also listed in Section 5.3.3 of the QAPP.

3.16 Oil Refinery Site Investigation Work Plan

3.16.1 Site Specific Conditions

3.16.1.1 General Description and Current Conditions

The Pacific Coast Oil Refinery was in operation from 1879 to 1903. It was located in the southeastern corner of the base (Figure 3.16.1) which has since been developed and occupied by other buildings.

3.16.1.2 Site History

During its 24 years of operation, refinery waste and asphalt-type residue were dumped at the site. After operations had ceased, the area was surfaced by the Navy in the 1940s. However, vapor pressure buildup resulting from previous site activities caused this surface to rupture. The problem was eventually addressed by excavating a 30 ft^2 area of the old material, pouring a concrete slab over the surface and backfilling. Although no further disturbance of the surface has occurred, drilling operations have encountered "black oil" in the area (E&E, 1983).

3.16.2 Sampling Objectives

The objective of the Oil Refinery sampling plan is to determine if residual contamination from the refinery operation is leaching into the ground water in this area.

The former site of the Oil Refinery has been developed. Four sites included in this investigation are built on the Oil Refinery site. Sampling and analytical plans for these four areas have already been developed. Additional data needed to evaluate the Oil Refinery site will be collected during the field investigations of these sites. Table 3.16.1 illustrates the sample collection and analytical plan needed to generate the data necessary to evaluate the Oil Refinery site. Figure 3.16.1 shows the proposed soil borings and monitoring wells for the area. This figure also illustrates the soil borings and well locations for Building 530, Building 547, Yard D-13 and Cans C-2 area.

3.16.3 Site Reconnaissance

Site reconnaissance of the Oil Refinery site will be conducted during the Building 530, Building 547, Yard D-13, and Cans C-2 site investigations.

3.16.4 Soil Sampling

Soil sampling of the Oil Refinery site will be conducted during the Building 530, Building 547, Yard D-13, and Cans C-2 site investigations.

3.16.5 Monitoring Well Installation

Monitoring wells at the Oil Refinery site will be installed during the Building 530, Building 547, Yard D-13, and Cans C-2 site investigations. Figure 3.16.1 and Table 3.16.2 also indicate an additional proposed monitoring well located in the southeast corner of the site.

Figure 2.4 is a generalized well construction diagram. Specific well construction procedures will be outlined in Section 4.5 of the QAPP. The actual depth of screen placement will be determined in the field.

3.16.6 Ground Water Sampling

Ground water samples will be collected during the Building 530, Building 547, Yard D-13, and Cans C-2 site sampling programs, and also from the proposed well site in the southeast corner of the site.

A site specific and analytical sampling plan has been developed for the Oil Refinery site. The types of samples to be collected and analyses to be performed have been developed using information gathered during the site visit, review of existing reports, and the comments and concerns of the EPA. Based on the previous reports, possible contaminants consist of waste oils and asphalt-type waste (E&E, 1983). Although no specific sampling has been done, drilling operations in the area had encountered a "black oil" zone leaving a residue on drilling equipment.

The proposed sample types and analyses for the Oil Refinery site can be seen in Table 3.16.1.

3.17 Fire Training Area Site Investigation Work Plan

3.17.1 Site Specific Conditions

3.17.1.1 General Description and Current Conditions

The Fire Training Area is located on the northern perimeter of the base in the vicinity of Building 443 (Figure 3.17.1). A steel tank, which sits on a concrete slab is used to burn waste fuels from NAS Alameda plane defueling operations. The site also serves as a fire extinguisher discharge point, and fire-fighting training area. Ansulite fire-fighting foam is mixed in a nearby tank and used to extinguish the fires.

3.17.1.3 Summary of Previous Site Investigations

No sampling of environmental media has been performed in the vicinity of the Fire Training Area. No sampling of environmental media has been performed in the vicinity of the fire training area. Waste at the fire training site include aqueous fire-fighting foam, CO_2, potassium chloride, purple K and Bowser fuels containing heavy metals (E&E, 1983).

3.17.2 Sampling Objectives

The objectives of the fire training area sampling plan is to determine the nature and extent of contamination that has been introduced to the subsurface from surface spills, leaks or releases of: contaminated fuels and oils from plane defueling operations and bowsers; aqueous fire-fighting foam; and potassium chloride from the discharge of fire extinguishers. A site-specific and analytical sampling plan has been developed for this site. The types of samples to be collected and analyses to be performed have been developed using information gathered during the site visit, review of existing reports, and comments and concerns of the EPA.

The sampling and analyses plan for the fire-training area can be seen in Table 3.17.1.

3.17.3 Site Reconnaissance

See Section 2.2.

3.17.4 Soil Gas Surveying

Soil gas surveying will be performed to define the possible extent of any petroleum hydrocarbon contamination and to also determine the optimal placement of proposed monitoring wells and/or soil borings (Figure 3.17.1) in the Fire Training Area. A 10-foot sampling grid will be established during the site reconnaissance phase of the investigation (Figure 3.17.1).

3.17.5 Soil Sampling

Field personnel will lay out a sample grid with a 10-foot spacing. Each node point of the sample grid will be sampled to a depth of 6 inches using a hand auger. This method is explained in Section 5.3.2 of the QAPP. Additional soil samples will be collected from the interior sides of the earthen berm to determine if this soil has become contaminated. Soil sampling points can be seen in Figure 3.17.1.

Surface soil samples will be collected at the location of each soil boring prior to set-up of the drilling equipment. Soil borings will be advanced to a depth of 15 feet. Continuous soil samples will be collected from this boring, and borings will be lithologically logged. Split spoon samplers will be used to collect soil samples for contaminant analyses. Split spoon and/or thin-walled tube samplers will be used to collect an undisturbed soil sample for physical property analyses. The type and number of soil samples to be collected from each boring is presented in Table 3.17.2. The order in which these samples are collected from a boring is left to the discrimination of the field personnel. The types of analyses to be performed on soil samples is presented in Table 3.17.1.

Soil sample collection methods have been described in Section 2. For specific information regarding the collection of samples or the decontamination of equipment refer to Section 5.3.2 of the QAPP.

3.17.6 Monitoring Well Installation

Table 3.17.2 and Figure 3.17.1 indicate the borings in which monitoring wells will be installed. These wells will be installed to allow the continual monitoring of ground water levels and to facilitate the collection of ground water samples.

Figure 2.4 is a generalized well construction diagram. Specific well construction procedures will be outlined in Section 4.5 of the QAPP. Wells will be completed to monitor the water table. The actual depth of screen placement will be determined in the field.

3.17.7 Ground Water Sampling

Ground water samples will be collected from the wells. These samples will be analyzed for the parameters listed in Table 3.17.1. The analytical results of these samples will be evaluated to determine if any contamination is present in the ground water in this area.

Ground water samples will be collected from the monitoring wells after the wells have been installed, developed, and allowed a sufficient recovery time. Floating product layers and thicknesses will also be determined. Water level measurements will be taken and recorded at each well prior to purging and sampling. A sufficient number of water samples will be collected to allow for the analyses of the ground water parameters listed on Table 3.17.1. Refer to Section 5.3.3 of the QAPP for information regarding well purging and sample collection procedures. The types of samples to be collected and the preservation method for these samples are also listed in Section 5.3.3 of the QAPP.

3.18 Buildings 301 and 389 Site Investigation Work Plan

3.18.1 Site Specific Conditions

3.18.1.1 General Description and Current Conditions

Buildings 301 and 389 foundation slabs are located north of Runway 7-25, approximately 500 feet inland of the Oakland Inner Harbor channel (Figure 3.18.1). Building 389 has been torn down, although its concrete floor slab and perimeter footings still remain. Building 301 and its associated yards serve as storage areas for electrical equipment, oil filled transformers and other disused machinery. During a site visit conducted in March, 1988, no visible signs of contamination were apparent other than the staining of a small area of bare ground immediately north of Building 301. Building 301 contained several 55-gallon drums of hydraulic fluid. No signs of contamination were visible.

3.18.1.2 Site History

An estimated 200 to 400 gallons of PCB oil may have been present in transformers stored at Building 389 in the past. Occasional leaks are believed to have occurred, but it has been stated that oil was routinely drained from the transformers and sprayed on the ground to control weed growth in the yards (E&E, 1983).

3.18.1.3 Summary of Previous Investigations

Based on the findings of the Initial Assessment Study, which concluded that PCBs had leaked and been sprayed on the ground, sampling of surface soil was performed by Wahler Associates during the verification step of the NACIP program (Wahler, 1985). Twelve shallow soil samples were taken north of the Building 389 concrete foundation pad. These were analyzed for PCBs only. The highest PCB concentration detected was 3 ppm (Wahler, 1985).

3.18.2 Sampling Objectives

The sampling objective at the Buildings 301 and 389 site is to determine the nature and extent of the contamination with a more representative sampling scheme and detailed analyses than was previously used.

The objective of the site investigation around Buildings 301 and 389 (Figure 3.18.1) is to define the amount and extent of PCB contamination in the soil of this area.

A previous soil characterization study (Wahler, 1985) detected low levels of PCB contamination around the Building 301 foundation. This RI/FS sampling plan will expand the area of investigation and conduct a more systematic sampling of soils to increase the statistical accuracy and precision of the analytical results. Table 3.18.1 lists the types of samples to be collected and the analyses to be performed on these samples.

3.18.3 Site Reconnaissance

See Section 2.2.

3.18.4 Soil Sampling

Field personnel will lay out a sample grid with a 25-foot spacing as shown in Figure 3.18.1.

Any surface runoff channels into the Oakland Estuary will be noted and sampled. These samples will be collected at the point where the channel intersects the estuary to determine if contaminants are entering the estuary as surface runoff.

Surface soil samples will be collected at the location of each soil boring prior to set-up of the drilling equipment. All soil borings will be advanced to a depth of 15 feet. Continuous soil samples will be collected from each boring, and borings will be lithologically logged. Split spoon samplers will be used to collect soil samples for contaminant analyses. Split spoon and/or thin-walled tube samplers will be used to collect undisturbed soil samples for physical property analyses. The type and number of soil samples to be collected from each boring is presented in Table 3.18.2. The order in which these samples are collected from a boring is left to the discrimination of the field personnel. The types of analyses to be performed on soil samples is presented in Table 3.18.1.

Soil sample collection methods have been described in Section 2. For specific information regarding the collection of samples of the decontamination of equipment refer to Section 5.3.2 of the QAPP.

3.18.5 Monitoring Well Installation

Table 3.18.2 and Figure 3.18.1 indicate the borings in which monitoring wells will be installed. This well will be installed to allow the continual monitoring of ground water levels and to facilitate the collection of ground water samples.

Figure 2.4 is a generalized well construction diagram. Specific well construction procedures will be outlined in Section 4.5 of the QAPP. The wells will be completed to monitor the water table. The actual depth of screen placement will be determined in the field.

3.18.6 Ground Water Sampling

Ground water samples will be collected from the wells. These samples will be analyzed for the parameters listed in Table 3.18.1. The analytical results of these samples will be evaluated to determine if any contamination is present in the ground water in this area.

Ground water samples will be collected from the monitoring wells after the wells have been installed, developed, and allowed a sufficient recovery time. Floating product layers and thickness will also be determined. Water level measurements will be taken and recorded at the wells prior to purging and sampling. A sufficient number of water samples will be collected to allow for the analyses of the ground water parameters listed on Table 3.18.1. Refer to Section 5.3.3 of the QAPP for information regarding well purging and sample collection procedures. The types of samples to be collected and the preservation method for these samples are also listed in Section 5.3.3 of the QAPP.

3.19 Cans C-2 Area Site Investigation Work Plan

3.19.1 Site Specific Conditions

3.19.1.1 General Description and Current Conditions

The CANS C-2 Area is located in the southeastern corner of the air station (Figure 3.19.1). The area is 6-1/2 acres in size, of which 3 acres are used as a storage yard and 3-1/2 acres are occupied by the "CANS". The CANS are large shipping containers that have been converted into warehouses; there are a total of 27 on the site. The storage yard is the site under investigation.

The CANS C-2 Area yard contains a variety of disused equipment and wastes. As of March, 1988, the area contained disused plating and paint stripping baths; electrical equipment; aircraft parts; and miscellaneous materials. The main storage yard is mostly unpaved though much of it is covered with perforated-steel temporary runway-plates.

3.19.1.2 Site History

In addition to the items identified above, the site has been a storage area for hazardous wastes. Materials stored include paints, solvents, acids, and PCB contaminated oils. Chemicals were contained in drums that leaked, corroded or were open, resulting in spills over a period of years. PCBs were used, as needed, for weed control in the area. This practice continued until 1963. One PCB spill from a transformer resulted in the excavation of 10 yd^3 of contaminated soil from the northwestern corner of the yard. The removal action was performed by IT Corporation in August, 1982.

3.19.1.3 Summary of Previous Site Investigations

Based on the recommendations of the Initial Assessment Study (E&E, 1983), sampling of ground water and surface soils was performed during the verification step of the NACIP program. One monitoring well was installed in the southwestern corner of the site, and ten shallow soil samples were taken. Elevated levels of lead and cadmium were detected in the soil, and low levels of cadmium and herbicides were found in the ground water.

3.19.2 Sampling Objectives

The objectives of the sampling and analyses plan at the CANS C-2 area is to assess the nature and extent of the contamination introduced to the subsurface from spills, leaks, or releases.

A site-specific and analytical sampling plan has been developed for the CANS C-2 area. The types of samples to be collected and analyses to be performed have been developed using information gathered during the site visit, review of existing reports, and comments and concerns of the EPA and DHS.

The proposed sample types and analyses for the CANS C-2 area can be seen in Table 3.19.1.

3.19.3 Site Reconnaissance

Refer to Section 2.2.

3.19.4 Soil Sampling

A grid system consisting of 50-foot squares will be used for systematic sampling for PCB contamination. Samples will be taken with a hand auger to a depth of 6 inches at all grid nodes specified in Figure 3.19.1. Also shown in Figure 3.19.1 are six borings whose locations were chosen by means of random selection of grid squares. The three borings in which monitoring wells will be installed are located along the perimeter of the CANS C-2 areas and were chosen specifically as a check for migration of contamination from the site. The actual boring locations and exact placement of the grid will be determined by field personnel after all the utilities and obstructions have been identified and located.

All relevant regulatory agencies will be notified before borings are begun. All preparation work at each site (see Section 2.2) must be completed before field sampling can begin. Hand augered soil samples will be advanced to a depth of 6 inches.

Surface soil samples will be collected at the location of each soil boring prior to the set-up of drilling equipment. Soil borings will be advanced to a depth of 15 feet. Continuous soil samples will be collected from each boring, and borings will be lithologically logged. Split spoon samplers will be used to collect soil samples for contaminant analyses. Split spoon and/or thin-walled tube samplers will be used to collect undisturbed soil samples for physical property analyses. The type and number of soil samples to be collected from each boring is presented in Table 3.19.2. The order in which these samples are collected from a boring is left to the discretion of the field personnel. The types of analyses to be performed on the soil samples is presented in Table 3.19.1. All borings not designated for monitoring well installation will be grouted.

Soil sample collection methods have been described in Section 2. For the decontamination of equipment refer to Section 5.3.2 of the QAPP.

3.19.5 Monitoring Well Installation

Table 3.19.2 and Figure 3.19.1 indicate the borings in which monitoring wells will be installed. These wells will be installed to allow the continual monitoring of ground water levels and to facilitate the collection of ground water samples.

Figure 2.4 is a generalized well construction diagram. Specific well construction procedures will be outlined in Section 4.5 of the QAPP. The actual depth of screen placement will be determined in the field.

3.19.6 Ground Water Sampling

Ground water samples will be collected from the wells listed in Table 3.19.2. These samples will be analyzed for the parameters listed in Table 3.19.1. The analytical results of these samples will be evaluated to determine if any contamination is present in the ground water in this area.

Ground water samples will be collected from the monitoring well shown in Figure 3.19.1 after the well has been installed, developed, and allowed a sufficient recovery time. The floating product layer and thickness will also be determined. WA-6, if locatable, will also be sampled and checked for the presence of a floating product layer. This well was installed during a previous investigation (Wahler, 1985). Water level measurements will be taken and recorded at each well prior to purging and sampling. A sufficient number of water samples will be collected to allow for the analyses of the ground water parameters listed on Table 3.19.1. Refer to Section 5.3.3 of the QAPP for information regarding well purging and sample collection procedures. The types of samples to be collected and the preservation method for these samples are also listed in Section 5.3.3 of the QAPP.

3.20 Seaplane Lagoon Site Investigation Work Plan

3.20.1 Site Specific Conditions

3.20.1.1 General Description and Current Conditions

The Seaplane Lagoon is located on the southern side of the base, with a surface area of approximately 110 acres (Figure 3.20.1). The lagoon ranges in depth from 12 to 20 feet, opening to the San Francisco Bay in the southwestern corner.

Untreated wastewaters from industrial activities are no longer discharged directly to the Seaplane Lagoon. After 1975, industrial wastewater began to be separated, collected, treated onsite, and discharged via the sanitary sewer system. The lagoon does receive overland drainage and storm drain discharge during wet weather.

3.20.1.2 Site History

The Seaplane Lagoon received raw industrial wastewaters from seven outflows between 1940 and 1975. Maintenance activities at Pier 1, south of the lagoon, are also thought to have contributed to contamination of the area. Wastewaters contaminated with heavy metals, acids, solvents, paints, radium, organics, and possibly PCBs have all reportedly been discharged to the lagoon. Studies concluded just prior to the abatement of lagoon discharges, indicated average flows in the region of 150,000 gallons per day (E&E, 1983). Discharge points were reportedly located in the northeastern and northwestern corners of the lagoon. Limited dredging has occurred. In 1981, 21,000 yd^3 were removed from the southeast side of the lagoon. Spoils were disposed of at the West Beach Landfill (E&E, 1983).

3.20.1.3 Summary of Previous Site Investigations

A number of studies have been conducted since the mid-1960s to determine flow rates to the lagoon and composition of discharges (Kurgmen, 1970; Navy, 1972). However, the most recent investigation was conducted by Wahler Associates as part of the NACIP Verification Step (Wahler, 1985). Ten sediment samples were collected from the lagoon and analyzed for metals, pesticides and PCBs. Elevated levels of some metals were detected in the samples, but no PCBs or pesticides were found (Wahler, 1985).

3.20.2 Sampling Objectives

As stated in Section 3.20.1.2, the Seaplane Lagoon has received untreated industrial discharges in the past, and continues to receive discharge from storm drains. Dredging operations were conducted in the 1940s, and 21,000 yd^3 of sediment was removed from the southwest side of the lagoon in 1981 (E&E, 1983). However, the potential for residual contamination exists, and more recent activities at Pier 1 including occasional spills of oil and fuel may have further contributed to contamination of the lagoon because these materials were apparently discharged through the station storm drain system. A current assessment of the water and sediment quality and the status of the aquatic habitat is therefore warranted.

The sampling and analyses objective for the Seaplane Lagoon site is to adequately define the nature and extent of the contamination present. Due to the diversity of contaminants entering the lagoon, a broad base of analyses will be used. A site-specific sampling and analytical plan has been developed for the Seaplane Lagoon.

The types of samples to be collected and analyses to be performed have been developed using information gathered during the site visit, review of existing reports, and the comments and concerns of the EPA and DHS.

The proposed sample types and analyses for the Seaplane Lagoon can be seen in Table 3.20.1. The type and number of samples to be collected are shown in Table 3.20.2.

3.20.3 Site Reconnaissance

See Section 2.2.

3.20.4 Sediment and Water Sampling

Sampling of the water column and sediments in the lagoon is proposed to fully characterize contaminant distribution and type. A sample grid has been created covering the Seaplane Lagoon to facilitate the systematic collection of samples for chemical analysis. Sediment samples will be collected at each of the node points and in areas adjacent to outfall locations. In addition, bioassays to determine the toxicity of sediments to marine macrobenthos will be performed. Sampling and laboratory procedures will be followed that are consistent with EPA accepted protocols (U.S. EPA, 1977).

Sampling of the water column in the lagoon will also be performed. It is believed that flows into the lagoon from wastewater outfalls and storm drains are insufficient to produce significant flushing (Kennedy, 1985). Therefore, the combined sampling of sediments and the water column, and the conducting of marine macrobenthos bioassays will provide the necessary data to assess the impacts of contamination on the benthic and pelagic organisms associated with the area. Surface water samples will be collected at the Seaplane Lagoon at each of the sediment sampling node points and at outfall locations, which are believed to represent areas of high chemical concentration in the sediments. Water samples will be collected before sediment samples to avoid the excessive turbidity typically created during sediment sampling. Surface water and sediment sampling locations for the Seaplane Lagoon are shown on Figure 3.20.1

Locations for two additional surface water samples and four bioassay sediment samples from the lagoon will be chosen after the results are available of laboratory analyses performed on the sediment samples collected for chemical analysis. Locations will be selected in sediment areas of high chemical concentrations.

3.20.5 Bioassays and Tissue Residue Analyses

Bioassays and tissue residue measurements are needed to evaluate potential impacts on the ecological communities of the area. Bioassays are useful for determining if chemicals present at the site are at concentrations that are toxic to the species that inhabit the waters of the NAS Alameda area. Tissue residue analyses are useful for determining if chemicals related to the site are accumulating in the food chain.

3.20.5.1 Bioassays

Macrobenthos bioassays are proposed for the sediments from the Seaplane Lagoon. Sediment toxicity should be evaluated because many of the chemicals potentially present at the site, including metals, chlorinated pesticides, and PCBs, can accumulate in sediments, thereby resulting in high exposures for benthic (sediment-dwelling) organisms. Sediments in the Seaplane Lagoon are selected for this evaluation because these areas have received waste discharges from NAS Alameda in the past and therefore potentially represent the marine environments most impacted by activities at NAS Alameda. Chemical contamination and associated impacts are expected to be less at other points in the Bay more distant from the suspected source areas of highest contamination.

Bioassays will be conducted using benthic species indigenous to the NAS Alameda areas. Measured toxic endpoints will represent both lethal (ie, survival) and nonlethal (eg, emergence from eggs, growth) responses as both types of effects can have direct effects on the health of the benthic community. At least eight sediment samples for the bioassays will be selected randomly from both grid point and outfall locations used to collect surface water and sediment samples. This number of bioassays should be sufficient to permit a statistical evaluation of the results depending on the variation of the measured endpoints. Bioassays using clean (uncontaminated) sediments are also needed to provide controls against the bioassays results from lagoon and estuary sediments. Additional control tests using sediments collected from other areas of the Bay that are similar ecologically but distant from NAS Alameda will be performed and will be useful for interpreting the nature of background contamination in the Bay in relationship to the chemical levels detected in NAS Alameda sediments.

3.20.5.2 Tissue Residue Analyses

Tissue residue analyses will be performed to evaluate if chemicals associated with the site are accumulating in the food chain. Several of the chemicals potentially present at the site are known to bioaccumulate in aquatic species to concentrations much higher than those in the surrounding water. For example, bioconcentration factors in the range of 100,000 to 450,000 have been reported for PCBs in fish. Animals feeding on aquatic life that has bioconcentrated chemicals could potentially receive high doses of chemicals in food even if concentrations in the surrounding waters are low or undetectable. The species at greatest risk from such food-chain exposure are those located near the top of the food chain. These include the California least terns and brown pelicans. Both species feed on fish from the Seaplane Lagoon and adjacent waters, areas potentially impacted by past releases of chemicals. Further, both species are classified as endangered by the state and federal government. Consequently, any toxic effects in these populations at NAS Alameda could impair the recovery of the species.

To conduct the tissue residue analyses, fish will be collected from the Seaplane Lagoon and will be analyzed for those chemicals which have high bioconcentration potential. The fish species collected from the Seaplane

Lagoon will be those fish that compose the diet of California least terns and pelicans, (including jack smelt, top smelt, and anchovy). Because of the mobility of the fish, tissue residue levels will reflect exposure to chemicals throughout their range, as well as any chemical accumulation associated with discharging into the Seaplane Lagoon.

Background samples of the same fish species mentioned above will also be collected from other areas close to NAS Alameda. These samples are needed to distinguish background Bay contamination from the chemical contamination associated with NAS Alameda. Whole body chemical concentrations and concentrations in edible tissues will be measured for the human health assessment. The chemical concentrations will be reported as dry weight. The lipid content of each sample will be measured, as well as moisture percentage. In addition, the size and age of the fish will be noted.

3.21 Station Sewer System Site Investigation Work Plan

3.21.1 Site Specific Conditions

3.21.1.1 General Description and Current Conditions

The station sewer system currently receives no untreated industrial discharges from activities occurring on the base. The station sanitary sewer system discharges to the East Bay Municipal Utilities District (EBMUD), and has been doing so since 1956. Industrial wastewaters are subject to pretreatment at Buildings 5, 360, and 410 prior to discharge to the sewer system. Storm drains flow directly into either the Seaplane Lagoon or the Oakland Inner Harbor. The integrity of the complex system of pipelines is not known.

3.21.1.2 Site History

Prior to 1956, NAS Alameda operated its own sanitary wastewater facility. The facility discharged directly to the estuary (E&E, 1983). After 1956 sanitary wastewaters were routed to the EBMUD system, and between 1972 and 1975 industrial wastewaters were also discharged to the system. Potential for contamination of the system resulted from Buildings 5, 360, 410, 114, 400, 14, and 10. Based on the nature of the industrial processes occurring in these buildings, the system would have received wastes from plating bath dumps; paints and paint strippers; pesticides and herbicides; waste fuels and oils; cleaning and degreasing solvents; and possibly PCB contaminated oils.

In addition, wastewaters have been reportedly discharged directly to the storm drains. This system ultimately discharged to the Seaplane Lagoon or the Oakland Inner Harbor Channel.

3.21.1.3 Summary of Previous Site Investigations

No comprehensive studies to determine the condition or contamination of the static sewer system have been conducted.

3.21.2 Sampling Objective

The sampling and analytical objective for the station sewer system is to determine if contamination has been introduced to the subsurface from surface spills or leaks in the subsurface sewer system. Because of the complexity of the station sewer system, it is beyond the scope of work for this project to attempt to assess the integrity of the entire system. However, the system will be characterized through sampling and analyses and ancillary data acquired from testing at Buildings 5, 360, 410, 114, 400, 14, and 10. Through the assessment of the integrity of the sewer system at these selected sites, a generalization of the overall integrity of the station system can be made and a decision on any further sampling could be formulated.

A site-specific and analytical sampling plan has been developed for the buildings mentioned above. The types of samples to be collected and analyses to be performed have been developed using information gathered during the site visit, review of existing reports, and comments and concerns of the EPA and DHS.

The proposed sample types and analyses for the station sewer system along with the rationale for the analyses can be seen in Table 3.21.1.

3.21.3 Site Reconnaissance

For a general overview of the site reconnaissance objectives refer to Section 2.2.

3.22 Yard D-13 Site Investigation Work Plan

3.22.1 Site Specific Conditions

3.22.1.1 General Description and Current Conditions

Yard D-13 is located immediately southwest of Building 360, approximately 1500 feet east of the Seaplane Lagoon (Figure 3.22.1). The yard is approximately 1-1/2 acres in size and is fenced on all sides. A small building, numbered 616, is located in the northwestern corner of the yard. The yard is a storage area for 55-gallon drums, most of which contain hazardous waste generated by activities on the base. Yard D-13 is operated pursuant to an Interim Status Document issued by DHS on April 30, 1981. Drummed wastes are stored by chemical class in rows separated by berms. There is also an empty drum storage area along the southern edge of the yard. As of March, 1988, the yard had recently been repaved to provide better traction for the fork-lift trucks. Waste types include alkali and Poison B; acid and acid oxidizer; and flammable and combustible (ERM-West and Aqua Resources, 1987).

3.22.1.2 Site History

The yard has served as a storage area for hazardous materials for several years. The old surface of the yard was reportedly broken in places which may have allowed seepage of contaminants into the soil.

3.22.1.3 Summary of Previous Site Investigations

No sampling of soil or ground water has been performed in the vicinity of Yard D-13. An operation plan for the Yard and Building 13 was prepared in 1987 by Environmental Resources Management and Aqua Resources (ERM-West and Aqua Resources, 1987).

3.22.2 Sampling Objectives

The objective of the Yard D-13 site investigation is to determine if hazardous waste has been introduced to the subsurface as a result of the handling and storage of hazardous materials in this area. This objective will be obtained by employing a soil boring, monitoring well installation, and ground water sampling program at the site.

A site-specific and analytical sampling plan has been developed for the Yard D-13 area. The types of samples to be collected and analyses to be performed have been developed using information gathered during the March, 1988 site visit.

The types of samples to be collected at Yard D-13, the types of analyses to be performed on these samples, and the rationale for this collection and analyses program can be seen in Table 3.22.1.

3.22.3 Site Reconnaissance

See Section 2.2.

3.22.4 Soil Sampling

A total of sixteen borings will be advanced in the Yard D-13 area for subsurface investigation. Four of these borings will be located just inside of the site perimeter for monitoring well installation. Figure 3.22.1 illustrates the proposed soil boring locations for this area. Actual boring locations will be determined by field personnel during the site reconnaissance phase of the investigation (see Section 2.2). All relevant regulatory agencies will be notified before borings are begun.

Surface soil samples will be collected at the location of each soil boring prior to set-up of the drilling equipment. Soil borings will be advanced to a depth of 15 feet. Continuous soil samples will be collected from each boring, and borings will be lithologically logged. Split spoon samplers will be used to collect soil samples for contaminant analyses. Split spoon and/or thin-walled tube samplers will be used to collect undisturbed soil samples for physical property analyses. The type and number of soil samples to be collected from each boring is presented in Table 3.8.2. The order in which these samples are collected from a boring is left to the discretion of the field personnel. The types of analyses to be performed on soil samples are presented in Table 3.8.1.

All borings not designated for monitoring well installation will be backfilled with cement/bentonite grout and where appropriate, capped with either an asphalt or concrete patch. Soil sample collection methods have been described in Section 2. Refer to Section 5.3.2 of the QAPP for specific information regarding the collection of samples and the decontamination of equipment.

3.22.5 Monitoring Well Installation

Table 3.22.2 and Figure 3.22.1 indicate the borings in which monitoring wells will be installed. These wells will be installed to allow the continual monitoring of ground water levels and to facilitate the collection of ground water samples.

Figure 2.4 is a generalized well construction diagram. Specific well construction procedures will be outlined in Section 4.5 of the QAPP. Monitoring wells will be completed so that the screened well interval will begin approximately 2 feet above the surface of the water table and at least 3 feet below the ground surface. The actual depth of screen placement will be determined in the field.

3.22.6 Ground Water Sampling

Ground water samples will be collected from the wells listed in Table 3.22.2. These samples will be analyzed for the parameters listed in Table 3.22.1. The analytical results of these samples will be evaluated to determine if any contamination is present in the ground water in this area.

Ground water samples will be collected from the monitoring wells after the wells have been installed, developed, and allowed a sufficient recovery time. Floating product layers and thicknesses will also be determined. Water level measurements will be taken and recorded at each well prior to purging and sampling. A sufficient number of water samples will be collected to allow for the analyses of the ground water parameters listed on Table 3.22.1. Refer to Section 5.3.3 of the QAPP for information regarding well purging and sample collection procedures. The types of samples to be collected and the preservation method for these samples are also listed in Section 5.3.3 of the QAPP.

3.23 Estuary (Oakland Inner Harbor) Site Investigation Work Plan

3.23.1 Site Specific Conditions

3.23.1.1 General Description and Current Conditions

The Oakland Inner Harbor channel borders the entire northern edge of NAS Alameda, a distance of approximately 2.2 miles (Figure 3.23.1). There are several discharge points along the northern perimeter, which are fed by the storm water collection system. No industrial wastewaters are directly discharged to the estuary.

3.23.1.2 Site History

Similar to the Seaplane Lagoon, the estuary served as a discharge point for approximately 150,000,000 gallons of untreated industrial and nonindustrial wastewater disposed of in the sewer system from 1943 to 1975. Wastes would have included organics, metals, oils, detergents and pesticides.

3.23.1.3 Summary of Previous Site Investigations

No sampling of sediment or aquatic biota has been performed along the southern shore of the estuary. A study conducted by the U.S. Army Corps of Engineers in 1987 did assess the water and sediment quality of the estuary. However, the majority of samples were taken along the northern bank of the estuary. Bioassay results did show an increase in mortality which may have resulted from the presence of metals and organics at elevated concentrations (U.S. Army Corps of Engineers, 1977).

Sampling of sediments is proposed at a number of locations along the southern edge of the Oakland Inner Harbor Channel to fully characterize contamination from past and present outfalls. Sampling will be performed at outfall locations and at other locations using a sampling grid system. Sediment sample collection locations are shown on Figure 3.22.1.

Sediment samples collected for bioassays will be used to determine the toxicity of the sediments to marine macrobenthos. Sampling and laboratory procedures will be followed consistent with EPA accepted protocols (U.S. EPA, 1988).

Surface water samples will be collected in the vicinity of the storm drain outfalls. Water samples will be collected before the sediment samples to avoid the excessive turbidity typically created during sediment sampling.

3.23.2 Sampling Objectives

The sampling objective for the estuary is to adequately define the nature and extent of the contamination present. Because of the quantity and quality of the wastewater discharged into the estuary, a representative sample base and wide range of chemical analyses are proposed in this study.

The types of samples to be collected and analyses to be performed have been developed using information gathered during the site visit, review of existing reports, and the comments and concerns of the EPA and DHS.

The proposed sample types and analyses for the estuary can be seen in Table 3.23.1.

3.23.3 Sediment Sampling and Bioassay Analyses

As stated in Section 3.23.1.2, the estuary has received industrial and non-industrial wastewater discharges resulting from operations at NAS Alameda. Untreated industrial wastewaters ceased to be discharged to the estuary in 1975, and dredging has been conducted since then. However, an assessment of sediment quality and the aquatic habitat is warranted based on past discharges and the continuing outflows from storm drains.

A sample grid has been created to facilitate the systematic collection of samples for chemical analyses. In addition, sediment sampling will also be

Figure 3.23.1. Bioassay sediment samples will be collected at four locations. Initially, one bioassay sediment sample will be collected near the sanitary sewer outfall, as shown on Figure 3.23.1. The locations for the three remaining bioassay sediment samples will be chosen from areas of high chemical concentrations in sediments as indicated by the results of laboratory analyses performed on the sediment samples collected for chemical analysis. Sampling locations for the Estuary are shown on Figure 3.23.1. Additional control tests using sediments (background samples) collected from other areas of the Bay that are similar ecologically but distant from NAS Alameda will be performed and will be useful for interpreting the nature of background contamination in the Bay in relationship to the chemical levels detected in NAS Alameda sediments. Background bioassay sediment samples for the estuary will be covered by those collected for the Seaplane Lagoon, as listed in Table 3.20.2.

3.23.4 Surface Water Sampling

Surface water sampling will be performed in the Estuary. Water samples will be collected in the vicinity of the storm drain outfalls in the Oakland Estuary, as shown on Figure 3.23.1. The purpose for characterizing the surface water quality is to evaluate the potential risks to species which use the Estuary as a feeding ground.

3.24 Wetland Areas (West of Seaplane Lagoon) Site Investigation Work Plan

3.24.1 General Description and Current Conditions

The sampling objective for the wetland area is to define the nature and extent of any possible contamination. Because of the types of industrial discharges into the nearby Seaplane Lagoon in the past, a representative assessment of the surface water, sediment, and benthic species of the wetland is therefore warranted. Selection of the sampling media were developed based on the comments and the data gaps issues discussed in the Public Health and Environmental Evaluation Plan (PHEE), Volume 7 of the

Public Health and Environmental Evaluation Plan (PHEE), Volume 7 of the RI/FS Work Plan. Proposed sample types and analyses are presented in Table 3.24.1.

3.24.2 Surface Water and Sediment Sampling

Surface water and sediment sampling will be performed in the wetland area. Surface water quality will be analyzed to evaluate the potential risks to species which use this area as a feeding ground. Sediment samples will be collected for the purpose of performing bioassays. Bioassays on the sediment samples will be performed using benthic species indigenous to the site. Sampling and laboratory protocols will be consistent with EPA accepted protocols (U.S. EPA, 1988).

3.24.3 Bioassays and Tissue Residue Analyses

A general discussion on bioassays and tissue residue analyses is provided in Section 3.20.5, 3.20.5.1, and 3.20.5.2.

Tissue residue levels will be analyzed in benthic species in the wetland area. Whole-body chemical concentrations will be reported as dry weight, and the moisture percentage and lipid content of each sample will be measured. The benthic species to be analyzed include those which are fed upon by the many species of shorebirds and ducks in the area. If it appears that no benthic organisms are present at the site during sampling activities, then no sampling of these species will be performed.

3.25 Background Sampling

3.25.1 Sampling Objectives

The objective for obtaining background samples of both soil and ground water is to assist in the evaluation of potential risks from the NAS Alameda site. Selection of appropriate background samples is important to the performance of a public health and environmental evaluation. Background sampling will be performed in response to data gap issues addressed in the Public Health and Environmental Evaluation Plan.

Background sampling will be achieved by drilling soil borings, installing monitoring wells, and obtaining samples for chemical analyses at four locations, as shown on Figure 3.25.1.

A site specific and analytical sampling plan has been developed for the background sampling locations. The types of samples to be obtained and analyses to be performed were developed using information and rationales from this Sampling Plan, Volume 1, and the Solid Waste Assessment Test (SWAT) Proposal Addendum, Volume 1A.

3.25.2 Site Reconnaissance

See Section 2.2.

3.25.3 Background Sampling Locations

Background soil and ground water samples will be collected from four areas at NAS Alameda. These areas include one location just east of the landfill areas and south of the Fire Training Area and Buildings 301/389, one location along Avenue F southeast of Building 10, one location along the eastern boundary of NAS Alameda near the East Gate, and one location northwest and upgradient of the Oil Refinery site. The approximate sampling locations are shown on Figure 3.25.1.

3.25.4 Soil Sampling

Figure 3.25.1 illustrates the approximate locations of the proposed soil borings/monitoring wells. The actual boring locations will be determined by field personnel after all the utilities and obstructions have been identified and located.

All relevant regulatory agencies will be notified before borings are begun. All preparation work at each site (see Site Reconnaissance section) must be completed before field sampling can begin.

Surface soil samples will be collected at the location of each soil boring prior to set-up of the drilling equipment. Soil borings will be advanced to a depth of 15 feet. Continuous soil samples will be collected from each boring, and borings will be lithologically logged. Split spoon samplers will be used to collect soil samples for contaminant analyses. Split spoon samplers and/or thin-walled tube samplers will be used to collect undisturbed soil samples for physical property analyses. The type and number of soil samples to be collected from each boring is presented in Table 3.25.5. The order in which these samples are collected from a boring is left to the discretion of the field personnel. The types of analyses to be performed on soil samples is presented in Tables 3.25.1, 3.25.2, 3.25.3 and 3.25.4. All borings will be converted to monitoring wells. Soil sample collection methods have been described in Section 2. Refer to Section 5.3.2 of the QAPP for specific information regarding the collection of samples and the decontamination of equipment.

3.25.5 Monitoring Well Installation

Monitoring wells will be installed to allow the continual monitoring of ground water levels and to facilitate the collection of ground water samples.

Figure 2.4 is a generalized well construction diagram. Specific well construction procedures are outlined in Section 4.5 of the QAPP. The actual depth of screen placement will be determined in the field.

3.25.6 Ground Water Sampling

Ground water samples will be collected from the wells listed in Table 3.25.5. These samples will be analyzed for the parameters listed in Tables

3.25.1, 3.25.2, 3.25.3, and 3.25.4. The analytical results of these samples will be evaluated to determine the background characteristics of the ground water in each area.

Ground water samples will be collected from the monitoring wells after the wells have been installed, developed, and allowed a sufficient recovery time. Water level measurements will be taken and recorded at each well prior to purging and sampling. A sufficient number of water samples will be collected to allow for the analyses of the ground water parameters listed in Tables 3.25.1, 3.25.2, 3.25.3, and 3.25.4. Refer to Section 5.3.3. of the QAPP for information regarding well purging and sample collection procedures. The types of samples to be collected and the preservation method for these samples are also listed in Section 5.3.3 of the QAPP.

3.26 Additional Offshore Sampling and Measurements of Tidal Influence

3.26.1 Sampling Objectives

Additional sampling of sediment and the water column will be performed in certain offshore areas of NAS Alameda, as recommended by DHS and as discussed in the data gaps section of the PHEE. These sampling points will be located about 50 feet offshore of the NAS Alameda shoreline. These locations are at points of potential ground water discharge and surface water runoff from contaminated sites within NAS Alameda.

The sampling and analyses objective for these sites is to adequately define the nature and extent of any contamination present in these offshore areas. To check the diversity of contaminants that could be entering San Francisco Bay through ground water discharge, a broad spectrum of analyses will be performed.

The proposed sample types and analyses can be seen in Table 3.26.1. The type and number are shown in Table 3.26.2.

3.26.2 Sediment and Surface Water Sampling

Sediment and surface water samples will be collected at the offshore locations shown on Figure 3.26.1. Marine macrobenthos bioassays will also be performed, if elevated levels of contamination are detected, as discussed in Section 3.20.5.1. Sampling and laboratory procedures will be followed that are consistent with EPA accepted protocols.

3.26.3 Measurement of Tidal Influence on Ground Water Levels

Concern has been expressed by DHS and in the data gaps discussions of the PHEE, Volume 7, that the tides in San Francisco Bay may exercise a significant influence on the ground water levels (and therefore on the ground water flow direction), at NAS Alameda, especially in areas near the shoreline. To measure any influence, a series of pressure transducers will be placed in selected monitoring wells to measure changes in the ground water levels. These transducers will be connected to a portable data logger to record measurements. Measurements will be continuously recorded for two 48-hour periods in each well where these data are collected. Data will be obtained during peak high and low tides.

Table 3.26.3 provides a list of the number of monitoring wells at each site where these studies will be performed. Measurements of this type have also been proposed for additional monitoring wells along the perimeter of the landfills, as discussed in Section 3.2.4 of Volume 1A, the SWAT Proposal Addendum.

REFERENCES

Code of Federal Regulations, 1985, 40 CRF Part 300, National Oil and Hazardous Substance Pollution Contingency Plan; Final Rule, November 20.

Ecology and Environment, 1983, Initial Assessment Study of Naval Air Station, Alameda, report prepared for Naval Energy and Environmental Support Activity, Port Hueneme, CA, April.

ERM-West, 1987, "Tank Testing Study, Alameda Naval Air Station, Alameda, California," final report prepared for Naval Facilities Engineering Command, San Bruno, CA, August.

Harding Lawson Associates, 1978, "Sanitary Landfill Site Study, Naval Air Station, Alameda, California," report prepared for Naval Facilities Engineering Command, San Bruno, CA, March 1.

Harding Lawson Associates, 1983, "Confirmation Study, Sanitary Landfill, Naval Air Station, Alameda, California," report prepared for Naval Facilities Engineering Command, San Bruno, CA, October 19.

Kennedy Engineers, 1980, "Subsurface Fuel Contamination Study, Naval Air Station, Alameda, California," final report prepared for Naval Facilities Engineering Command, San Bruno, CA, January.

Post, Buckley, Schuh & Jernigan, Inc., 1981, "NARF Industrial Waste Survey, Alameda, California, Activity Report," prepared for Naval Facilities Engineering Command, Port Hueneme, CA, June.

Radbruch, D. H., 1957, "Areal and Engineering Geology of the Oakland West Quadrangle, California," U.S. Geological Survey Misc. Investigations I-239.

U.S. Army Corps of Engineers, 1977, "Ecological Evaluation of Proposed Discharge of Dredged Material into Ocean Waters," Implementation Manual for Sec. 103 of PL 92-532, App. F, U.S. EPA/Corps of Engineers Tech. Comm. on Criteria for Dredged and Fill Material, U.S. Army Corps of Engineers Waterways Experiment Station, Vicksburg, Mississippi.

U.S. Environmental Protection Agency, 1985, "Guidance on Remedial Investigations under CERCLA," May.

_______, 1986, "RCRA Ground-Water Monitoring Technical Enforcement Guidance Document," OSWER-9950.1, September.

_______, 1987, "Comments Regarding NAS Alameda's Installation Assessment Study (IAS) Verification Step Report, and Confirmation Study/Characterization Step Work Plan," letter dated June 30.

_______, 1987, "RCRA Facility Investigation Guidance Vol I," EPA 530/SW-87-001, July.

REFERENCES
(Continued)

U.S. Environmental Protection Agency, 1988, "Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA," draft, OSWER-9355.3-01, March.

_______, "Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans," QAM5-005/08.

_______, "Preparation of a U.S. EPA Region 9 Sample Plan."

Wahler Associates, 1985," Verification Step Confirmation Study, Naval Air Station, Alameda," draft report for Western Div., Naval Facilities Engineering Command, Contract N62474-83-C-3075, May.

_______, 1986, "Confirmation Study (Characterization Step), Work Plan for Naval Air Station, Alameda, California," draft report prepared for Naval Facilities Engineering Command, San Bruno, CA, February.

N00236.000785
ALAMEDA POINT
SSIC NO. 5090.3

TABLES

FINAL SAMPLING PLAN
REMEDIAL INVESTIGATION / FEASIBILITY STUDY

DATED 01 FEBRUARY 1990

TABLE 2.5.1

PARAMETERS TO BE ANALYZED FOR

Priority Pollutant Inorganics	Priority Pollutant Volatile Organics	Priority Pollutant Pesticides/PCBs
Antimony	Benzene	Aldrin
Arsenic	Bis(Chloromethyl)Ether	alpha-BHC
Beryllium	Bromoform	beta-BHC
Cadmium	Bromodichloromethane	delta-BHC
Chromium III & VI	Bromomethane	gamma-BHC
Copper	Carbon Tetrachloride	Chlordane
Cyanide	Chlorobenzene	4,4'-DDD
Lead	Chloroethane	4,4'-DDE
Mercury	2-Chloroethylvinyl Ether	4,4'-DDT
Nickel	Chloroform	Dieldrin
Selenium	Chloromethane	Endosulfan I
Silver	Cis-1,3-Dichloropropane	Endosulfan II
Thallium	Dibromochloromethane	Endosulfan Sulfate
Zinc	Dichlorodifluoromethane	Endrin
	1,1-Dichloroethane	Endrin Aldehyde
	1,2-Dichloroethane	Heptachlor
	1,1-Dichloroethene	Heptachlor Epoxide
	Trans-1,2-Dichloroethene	Toxaphene
	Trans-1,3-Dichloropropene	PCB-1016
	1,2-Dichloropropane	PCB-1221
	Ethylbenzene	PCB-1232
	Methylene Chloride	PCB-1242
	1,1,2,2-Tetrachloroethane	PCB-1248
	Cis-1,2-Dichloroethene	PCB-1254
	Tetrachloroethene	PCB-1260
	Toluene	
	1,1,1-Trichloroethene	
	1,1,2-Trichloroethane	
	Trichloroethene	

TABLE 2.5.1

PARAMETERS TO BE ANALYZED FOR

Priority Pollutant Inorganics	Priority Pollutant Volatile Organics	Priority Pollutant Pesticides/PCBs
	Trichlorofluoromethane	
	Vinyl Chloride	
	Ethylene Dibromide	

Priority Pollutant Semivolatile Organics

Acenaphthene	Fluoranthene
Acenaphthylene	Fluorene
Anthracene	Hexachlorobenzene
Benzidine	Hexachlorobutadiene
Benzo(a)Anthracene	Hexachlorocyclopentadiene
Benzo(a)Pyrene	Hexachloroethane
Benzo(b)Fluoranthene	Indeno(1,2,3)Pyrene
Benzo(g,h,i)Perylene	Isophrone
Bis(2-Cholorethoxy)Methane	2-Methylnaphthalene
Bis(2-Chloroethyl)Ether	Naphthalene
Bis(2-Chloroisopropyl)Ether	Nitrobenzene
Bis(2-Ethylhexy)Phthalate	N-Nitroso-Dimethylamine
4-Bromophenyl Phenyl Ether	N-Nitroso-di-N-Propylamine

TABLE 2.5.1

PARAMETERS TO BE ANALYZED FOR

Priority Pollutant Semivolatile Organics

Butyl Benzyl Phthalate	N-Nitrosodiphenylamine
2-Chloronapthalene	Phenanthrene
4-Chlorophenol Phenyl Ether	Pyrene
Chrysene	1,2,4-Trichlorobenzene
Dibenzo(a,h)Anthracene	4-Chloro-3-Methylphenol
1,2-Dichlorobenzene	2,-Chlorophenol
1,3-Dichlorobenzene	2,4-Dichlorophenol
1,4-Dichlorobenzene	2,4-Dimethylphenol
3,3'-Dichlorobenzidine	4,6-Dinitro-2-Methylphenol
Diethyl Phthalate	2,4-Dinitrophenol
Dimethyl Phthalate	2-Nitrophenol
Din-n-Butyl Phthalate	4-Nitrophenol
2,4-Dinitrotoluene	Pentachlorophenol
2,6-Dinitrotoluene	Phenol
Di-n-Octyl Phthalate	2,4,6-Trichlorophenol
1,2-Diphenylhydrazine	

TABLE 2.5.2

ANALYTICAL METHODS

Chemical Class	Matrix	Method	Reference
Volatile Organics	Water	624, (Initial only) 601	a
	Soil/Sediment	8240 (Initial only) 8010	b
BNA Extractables	Water	625 (Initial only) 602	a
	Soil/Sediment	8270 (Initial only) 8020	b
Pesticides/PCBs	Water	608	a
	Soil/Sediment	8080	b
Organophosphorus Pesticides	Water	614	d
	Soil/Sediment	8140	d
Herbicides	Water	509B	c
	Soil/Sediment	509B	c
Simazine	Water	619	
	Soil/Sediment	619 Modified	
Carbamates	Water	632	
	Soil/Sediment	632 Modified	
Monuron	Water	632	
	Soil/Sediment	632 Modified	
Bromacil	Water	633	
	Soil/Sediment	633 Modified	
Metals (Except Mercury)	Water	200.7	d
	Soil/Sediment	3050/6010	c
Mercury	Water	245.1	d
	Soil/Sediment	245.5	d
Chromium VI	Water	7196	b
	Soil/Sediment	7196	b
Petroleum Hydrocarbons	Water	418	d
	Soil/Sediment	418	d
Oil and Grease	Water	413.1	d
Gross Alpha & Beta Radioactivity	Water	900.0	e
	Soil/Sediment	900.0	e

TABLE 2.5.2

ANALYTICAL METHODS
(Continued)

Chemical Class	Matrix	Method	Reference
Uranium 226 & 228	Water	706/7	e
	Soil/Sediment	706/7	e
Cyanide	Water	335.3	d
	Soil/Sediment	9010	b
COD	Water	410.1	d
BOD	Water	405.1	d
Chloride	Water	325.5	d
Nitrates/Nitrites	Water	300	
	Soil/Sediment	300	
Fluoride	Water	340.2	d
Dissolved Oxygen	Water	360.1	d

Notes:

1. BNA indicates base, neutral, and acid.

2. EP Tox indicates Extraction Procedure Toxicity Test.

3. COD indicates chemical oxygen demand.

4. BOD indicates biological oxygen demand.

[a] Federal Register, Vol. 49, No. 209, Friday, October 26, 1984.

[b] United States Environmental Protection Agency, 1982, Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, Second Edition, U.S. EPA, Office of Solid Waste and Emergency Response, Washington, DC, July, revised April 1984.

[c] American Public Health Association, Standard Methods for the Examination of Waste and Wastewater, Washington, DC.

[d] United States Environmental Protection Agency, 1979, Methods for Chemical Analysis of Water and Wastes, EPA-600/A-79-02, U.S. EPA, Environmental Monitoring and Support Laboratory, Cincinnati, Ohio, March, revised March 1982.

TABLE 2.5.2

ANALYTICAL METHODS
(Continued)

[e]United States Environmental Protection Agency,1982, Prescribed Procedures for the Measurement of Radioactivity in Drinking Water, EPA 600/4-80-032, U.S. EPA, Environmental Monitoring and Support Laboratory, Las Vegas.

TABLE 2.5.3

GENERALIZED CHEMICAL SAMPLE ANALYSES FOR NAS-ALAMEDA SITES

Samples Site	Sample Matrix	Analysis
West Beach Landfill 1943-56 Disposal Area	Surface Soils	BNA extractables, pesticides/PCB's, metals, gross alpha and beta, uranium 226 and 228, asbestos
West Beach Landfill & 1943-56 Disposal Area	Soil	VOA, BNA extractables, pesticides/ PCBs, metals, gross alpha & beta, uranium 226 & 228, asbestos
West Beach Landfill & 1943-56 Disposal Area	Ground Water	VOA, BNA extractables, pesticides/ PCBs, metals, gross alpha & beta, uranium 226 & 228, asbestos, COD, chloride, fluoride, cyanide, TOC
1943-56 Disposal Area	Air	VOA, BNA extractables, metals
Area 97	Surface Soils	Petroleum hydrocarbons, metals, BNA extractables
Area 97	Soil	VOA, BNA extractables, petroleum hydrocarbons, metals
Area 97	Ground Water	VOA, BNA extractables, petroleum hydrocarbons, metals, ethylene dibromide
Area 97	Air	VOA
Building 360	Surface Soils	BNA extractables, metals, total cyanides
Building 360	Soil	VOA, BNA extractables, metals, total cyanides
Building 360	Ground Water	VOA, BNA extractables, metals, total cyanides, petroleum hydrocarbons
Building 360	Air	VOA, metals
Building 5	Surface Soils	BNA extractables, metals, total cyanides, asbestos
Building 5	Soil	VOA, BNA extractables, metals, total cyanides, asbestos
Building 5	Ground Water	VOA, BNA extractables, metals, total cyanides

TABLE 2.5.3

GENERALIZED CHEMICAL SAMPLE ANALYSES FOR NAS-ALAMEDA SITES
(Continued)

Samples Site	Sample Matrix	Analysis
Building 5	Air	VOA, metals
Building 41	Surface Soils	BNA extractables, metals
Building 41	Soil	VOA, BNA extractables, metals, pesticides/PCBs
Building 41	Ground Water	VOA, BNA extractables, metals, pesticides/PCBs, oil and grease
Building 459	Surface Soils	BNA extractables, metals, pesticides/PCBs
Building 459	Soil	VOA, BNA extractables, petroleum hydrocarbons, metals, pesticides/PCBs
Building 459	Ground Water	VOA, BNA extractables, petroleum hydrocarbons, metals, ethylene dibromide, pesticides/PCBs
Building 459	Air	VOA
Building 547	Surface Soils	BNA extractables, metals, pesticides/PCBs
Building 547	Soil	Petroleum hydrocarbons, metals, VOA, BNA extractables, pesticides/PCBs
Building 547	Ground Water	Petroleum hydrocarbons, metals, ethylene dibromide, VOA, pesticides/PCBs, BNA extractables
Building 547	Air	VOA
Building 162	Surface Soils	BNA extractables, metals, pesticides/PCBs
Building 162	Soil	Petroleum hydrocarbons, VOA, BNA extractables, metals, pesticides/PCBs
Building 162	Ground Water	VOA, BNA extractables, ethylene dibromide, metals, pesticides/PCBs
Building 162	Air	VOA

TABLE 2.5.3

GENERALIZED CHEMICAL SAMPLE ANALYSES FOR NAS-ALAMEDA SITES
(Continued)

Samples Site	Sample Matrix	Analysis
Building 114	Surface Soils	BNA extractables, metals, mercury, pesticides/PCBs
Building 114	Soil	VOA, BNA extractables, metals, mercury, pesticides/PCBs
Building 114	Ground Water	VOA, BNA extractables, metals, mercury, pesticides/PCBs
Building 410	Surface Soils	BNA extractables, metals
Building 410	Soil	VOA, BNA extractables, metals
Building 410	Ground Water	VOA, BNA extractables, metals
Building 410	Air	VOA, metals
Building 530	Surface Soils	BNA extractables, metals
Building 530	Soil	Metals, petroleum hydrocarbons, VOA, BNA extractables
Building 530	Ground Water	VOA, BNA extractables, metals, petroleum hydrocarbons, oil and grease
Building 530	Air	VOA, metals
Building 400	Surface Soils	BNA extractables, metals
Building 400	Soil	VOA, BNA extractables, metals
Building 400	Ground Water	VOA, BNA extractables, metals
Building 400	Air	VOA, metals
Building 14	Soil	Petroleum hydrocarbons, metals, mercury, VOA, BNA extractables
Building 14	Ground Water	Petroleum hydrocarbons, metals, mercury, VOA, BNA extractables
Building 10 Power Plant	Surface Soils	BNA extractables, metals, pesticides/PCBs

TABLE 2.5.3

GENERALIZED CHEMICAL SAMPLE ANALYSES FOR NAS-ALAMEDA SITES
(Continued)

Samples Site	Sample Matrix	Analysis
Building 10 Power Plant	Soil	Petroleum hydrocarbons, metals, VOA, BNA extractables, pesticides/PCBs
Building 10 Power Plant	Ground Water	VOA, BNA extractables, metals, pesticides/PCBs
Building 10 Power Plant	Air	VOA
Oil Refinery	Surface Soils	BNA extractables, metals, PCBs
Oil Refinery	Soil	Petroleum hydrocarbons, BNA extractables, VOA, metals, pesticides/ PCBs
Oil Refinery	Ground Water	Petroleum hydrocarbons, BNA extractables, VOA, metals, pesticides/ PCBs
Oil Refinery	Air	VOA, BNA extractables, metals
Fire-Training Area	Surface Soils	Metals, pesticides/PCBs, dioxins/furans, BNA extractables
Fire-Training Area	Soil	VOA, BNA extractables, metals, pesticides/PCBs, petroleum hydrocarbons
Fire-Training Area	Ground Water	VOA, BNA extractables, petroleum hydrocarbons, metals, oil and grease, pesticides/PCBs
Fire-Training Area	Air	VOA, BNA extractables, metals, pesticides/PCBs
Building 301 & 389	Surface Soils	Metals, pesticides/PCBs, BNA extractables
Building 301 & 389	Soil	VOA, BNA extractables, metals, pesticides/PCBs
Building 301 & 389	Ground Water	VOA, BNA extractables, petroleum hydrocarbons, metals, peticides/PCBs
CANS C-2 Area	Surface Soils	Pesticides/PCBs, metals, total cyanides, BNA extractables

TABLE 2.5.3

GENERALIZED CHEMICAL SAMPLE ANALYSES FOR NAS-ALAMEDA SITES
(Continued)

Samples Site	Sample Matrix	Analysis
CANS C-2 Area	Soil	VOA, BNA extractables, metals, total cyanides, pesticides/PCBs,
CANS C-2 Area	Ground Water	VOA, BNA extractables, metals, total cyanide, pesticides/PCBs, petroleum hydrocarbons
CANS C-2 Area	Air	VOA, BNA extractables, metals, pesticides/PCBs
Seaplane Lagoon	Surface Water	Metals, mercury, VOA, BNA extractables, oil and grease, pesticides/PCBs, COD, BOD
Seaplane Lagoon	Sediment	VOA, BNA extractables, metals, pesticides/PCBs, mercury
Station Sewer System	Soil	VOA, BNA extractables, metals, mercury, petroleum hydrocarbons, total cyanide, asbestos, pesticides/PCBs, herbicides, organophosphorus pesticides, ethylene dibromide
Station Sewer System	Ground Water	VOA, BNA extractables, metals, mercury, petroleum hydrocarbons, total cyanide, asbestos, pesticides/PCBs, herbicides, organophosphorus pesticides, ethylene dibromide
Yard D-13	Surface Soils	BNA extractables, metals, total cyanides, pesticides/PCBs
Yard D-13	Soil	VOA, BNA extractables, metals, total cyanides, pesticides/PCBs, petroleum hydrocarbons
Yard D-13	Ground Water	VOA, BNA extractables, metals, total cyanides, pesticides/PCBs, petroleum hydrocarbons, oil and grease
Yard D-13	Air	VOA
Estuary	Sediment	VOA, BNA extractables, metals, mercury, pesticides/PCBs
Estuary	Surface Water	VOA, BNA extractables, metals, oil and grease, pesticides/PCBs

TABLE 2.5.3

GENERALIZED CHEMICAL SAMPLE ANALYSES FOR NAS-ALAMEDA SITES
(Continued)

Samples Site	Sample Matrix	Analysis
Wetland	Sediments	VOA BNA extractables, metals, pesticides/PCBs, oil and grease
Wetland	Surface Water	VOA, BNA extractables, metals, pesticides/PCBs, oil and grease

Notes:

1. VOA indicates volatile organic analysis
2. BNA indicates base, neutral, and acid
3. TOC indicates total organic carbon
4. TDS indicates total dissolved solids
5. PCBs indicates polychlorinated biphenyls

TABLE 3.3.1

SAMPLE TYPES AND ANALYSES/RATIONALE FOR AREA 97

Sample Matrix	Analysis	Rationale
Soils		
Surface Samples	Metals	AVGAS releases
	Petroleum Hydrocarbons	AVGAS releases
	BNA Extractables	AVGAS releases
	Gradation	Describes fate and transport
	Permeability	Describes fate and transport
Split Spoon Samples	BNA Extractables	AVGAS releases
	Metals	AVGAS releases
	Petroleum Hydrocarbons	AVGAS releases
	VOA	AVGAS releases
	Ethylene Dibromide	AVGAS releases
Split Spoon and/or Thin-Walled Tube Samples	Gradation	Disposal, treatment, isolation
	Atterberg Limits	Disposal, treatment, isolation
	Modified Proctor Compaction	Evaluate disposal options
	Water Content/ Dry Density	Affects treatment method
	Specific Gravity	Indicates density
	One-Dimensional Consolidation	Evaluate disposal options
	Permeability	Describe fate and transport
	Nutrients	Effectiveness of in-situ biotreatment
	pH	Describe fate and transport
	TOC	Describe fate and transport
	Ash Content	Evaluate remedial response options
	Btu Value	Evaluate remedial response options
	Chlorine Content	Evaluate remedial response options
Ground Water	VOA	AVGAS releases
	BNA Extractables	AVGAS releases
	Ethylene Dibromide	AVGAS releases
	Metals	AVGAS releases
	Petroleum Hydrocarbons	AVGAS releases
	Hardness	Affects treatment method
	Alkalinity	General treatment information
	TDS	General treatment information
	TOC	Evaluate treatment information
	pH	Describe fate and transport
	Dissolved oxygen	Describe fate and transport

TABLE 3.3.1

SAMPLE TYPES AND ANALYSES/RATIONALE FOR AREA 97

Sample Matrix	Analysis	Rationale
Ground Water (Continued)	Acidity Specific Conductance	General treatment information Describe fate and transport
Air	VOA	AVGAS releases

Notes:

1. AVGAS indicates aviation gasoline.
2. VOA indicates volatile organic analysis.
3. BNA indicates base, neutral, and acid.
4. TOC indicates total organic carbon.
5. TDS indicates total dissolved solids.

TABLE 3.3.2

NUMBER AND TYPE OF SAMPLES TO BE COLLECTED AT AREA 97

Boring No.	Total Depth (ft)	Total Soil Samples	Surface Soil Samples	Split Spoon Samples	Thin-Walled Samples	Install Monitoring Well	Sample Ground Water
B97-1	15	6	1	4	1	MW97-1	Yes
B97-2	15	6	1	4	1	MW97-2	Yes
B97-3	15	6	1	4	1	MW97-3	Yes

TABLE 3.4.1

SAMPLE TYPES AND ANALYSES/RATIONALE FOR BUILDING 360

Sample Matrix	Analysis	Rationale
Soils		
Surface Samples	BNA Extractables	Paint stripping
	Metals	Metal stripping and plating
	Total Cyanide	Metal stripping and plating
	Gradation	Describe fate and transport
	Permeability	Describe fate and transport
Split Spoon Samples	VOA	Paint stripping
	BNA Extractables	Paint stripping
	Metals	Metal stripping and plating
	Total Cyanide	Metal stripping and plating
Split Spoon and/or Thin-Walled Tube Samples	Gradation	Describe fate and transport
	Modified Proctor Compaction	Evaluate disposal options
	Water Content/Dry Density	Affects treatment method
	Specific Gravity	Indicates density
	One-Dimensional Consolidation	Evaluate disposal options
	Permeability	Describe fate and transport
	pH	Describe fate and transport
	CEC	Determines mobility of metals
	TOC	Describe fate and transport
Ground Water	VOA	Paint stripping
	BNA Extractables	Paint stripping
	Metals	Metal stripping and plating
	Total Cyanide	Metal stripping and plating
	Petroleum Hydrocarbons	
	General Minerals	Evaluate water quality and seawater intrusion
	Hardness	Affects treatment method
	Alkalinity	General treatment information
	TDS	General treatment information
	TOC	Evaluate treatment information
	pH	Describe fate and transport
	Dissolved Oxygen	Describe fate and transport
	Acidity	General treatment information
	Specific Conductance	Describe fate and transport

TABLE 3.4.1

SAMPLE TYPES AND ANALYSES/RATIONALE FOR BUILDING 360

Sample Matrix	Analysis	Rationale
Air	VOA	Paint stripping
	Metals	Metal stripping and plating

Notes:

1. VOA indicates volatile organic analysis.
2. BNA indicates base, neutral, and acid.
3. CEC indicates cation-exchange capacity.
4. TOC indicates total organic carbon.
5. TDS indicates total dissolved solids.

TABLE 3.4.2

NUMBER AND TYPE OF SAMPLES TO BE COLLECTED AT SITE 360

Boring No.	Total Depth (ft)	Total Soil Samples	Surface Soil Samples	Split Spoon Samples	Thin-Walled Samples	Install Monitoring Well	Sample-Ground Water
B360-1	15	6	1	4	1	MW360-1	Yes
B360-2	15	6	1	5	--	MW360-2	Yes
B360-3	15	6	1	5	--	MW360-3	Yes
B360-4	15	6	1	4	1	MW360-4	Yes
B360-5	15	6	1	5	--	--	--
B360-6	15	6	1	4	1	--	--
B360-7	15	6	1	5	--	--	--
B360-8	15	6	1	5	--	--	--
B360-9	15	6	1	5	--	--	--
30 shallow samples	Approx 0.5	30	30				

TABLE 3.5.1

SAMPLE TYPES AND ANALYSES/RATIONALE FOR BUILDING 5

Sample Matrix	Analysis	Rationale
Soils		
Surface Samples	BNA Extractables	Point stripping
	Metals	Metal manufacturing
	Total Cyanide	Metal manufacturing
	Asbestos	
	Gradation	Describe fate and transport
	Permeability	Describe fate and transport
Split Spoon Samples	VOA	Paint stripping
	BNA Extractables	Paint stripping
	Metals	Metal manufacturing
	Total cyanide	Metal manufacturing
	Asbestos	
Split Spoon and/or Thin-Walled Tube Samples	Gradation	Describe fate and transport
	Modified Proctor Compaction	Evaluate disposal options
	Water Content/Dry Density	Affects treatment method
	Specific Gravity	Indicates density
	One-Dimensional Consolidation	Evaluate disposal options
	Permeability	Describe fate and transport
	pH	Describe fate and transport
	CEC	Determines mobility of metals
	TOC	Describe fate and transport
Ground Water	VOA	Paint stripping
	BNA Extractables	Paint stripping
	Metals	Metal manufacturing
	General Minerals	Evaluate water quality and seawater intrusion
	Total Cyanide	Metal manufacturing
	Hardness	Affects treatment method
	Alkalinity	General treatment information
	TDS	General treatment information
	TOC	Evaluate treatment information
	pH	Describe fate and transport
	Dissolved oxygen	Describe fate and transport
	Acidity	General treatment information
	Specific Conductance	Describe fate and transport

TABLE 3.5.1

SAMPLE TYPES AND ANALYSES/RATIONALE FOR BUILDING 5
(Continued)

Sample Matrix	Analysis	Rationale
Air	VOA	Paint stripping
	Metals	Metal manufacturing

Notes:

1. VOA indicates volatile organic analysis.
2. BNA indicates base, neutral, and acid.
3. CEC indicates cation-exchange capacity.
4. TOC indicates total organic carbon.
5. TDS indicates total dissolved solids.

TABLE 3.5.2

NUMBER AND TYPE OF SAMPLES TO BE COLLECTED AT SITE 5

Boring No.	Total Depth (ft)	Total Soil Samples	Surface Soil Samples	Split Spoon Samples	Thin-Walled Samples	Install Monitoring Well	Sample Ground Water
B5-1	15	6	1	5	--	MW5-1	Yes
B5-2	15	6	1	5	--	MW5-2	Yes
B5-3	15	6	1	4	1	MW5-3	Yes
B5-4	15	6	1	4	1	MW5-4	Yes
B5-5	15	6	1	5	--	MW5-5	Yes
B5-6	15	6	1	5	--	--	--
B5-7	15	6	1	4	1	--	--
B5-8	15	6	1	4	1	--	--
B5-9	15	6	1	5	--	--	--
B5-10	15	6	1	5	--	--	--
B5-11	15	6	1	5	--	--	--
B5-12	15	6	1	4	1	--	--
B5-13	15	6	1	4	1	--	--

TABLE 3.6.1

SAMPLE TYPES AND ANALYSES/RATIONALE FOR BUILDING 41

Sample Matrix	Analysis	Rationale
Soils		
Surface Samples	BNA Extractables	Paint stripping
	Metals	Metal stripping
	Gradation	Describe fate and transport
	Permeability	Describe fate and transport
Split Spoon Samples	VOA	Paint stripping
	BNA Extractables	Paint stripping
	Metals	Metal stripping
	Pesticides/PCBs	Hydraulic fluid
Split Spoon and/or Thin-Walled Tube Samples	Gradation	Describe fate and transport
	Modified Proctor Compaction	Evaluate disposal options
	Water Content/Dry Density	Affects treatment method
	Specific Gravity	Indicates density
	One-Dimensional Consolidation	Evaluate disposal options
	Permeability	Describe fate and transport
	TOC	Describe fate and transport
	pH	Describe fate and transport
Ground Water	VOA	Paint stripping
	BNA Extractables	Paint stripping
	Metals	Metal Stripping
	Oil and Grease	Hydraulic fluid
	Pesticides/PCBs	Hydraulic fluid
	General Minerals	Evaluate water quality and seawater intrusion
	pH	Describe fate and transport
	TOC	Describe fate and transport
	Dissolved Oxygen	Describe fate and transport

Notes:

1. VOA indicates volatile organic analysis.
2. BNA indicates base, neutral, and acid.
3. TOC indicates total organic carbon.
4. PCBs indicates polychlorinated biphenyls

TABLE 3.6.2

NUMBER AND TYPE OF SAMPLES TO BE COLLECTED AT SITE 41

Boring No.	Total Depth (ft)	Total Soil Samples	Surface Soil Samples	Split Spoon Samples	Thin-Walled Samples	Install Monitoring Well	Sample Ground Water
B41-1	15	6	1	5	--	MW41-1	Yes
B41-2	15	6	1	5	--	MW41-2	Yes
B41-3	15	6	1	5	--	MW41-3	Yes
B41-4	15	6	1	4	1	MW41-4	Yes
B41-5	15	6	1	5	--	MW41-5	Yes
B41-6	15	6	1	4	1	--	--
B41-7	15	6	1	5	--	--	--
B41-8	15	6	1	5	--	--	--
B41-9	15	6	1	5	--	--	--
B41-10	15	6	1	5	--	--	--
B41-11	15	6	1	5	--	--	--
B41-12	15	6	1	5	--	--	--
B41-13	15	6	1	5	--	--	--
B41-14	15	6	1	5	--	--	--
B41-15	15	6	1	5	--	--	--
B41-16	15	6	1	4	1	--	--
B41-17	15	6	1	5	--	--	--
B41-18	15	6	1	5	--	--	--
B41-19	15	6	1	5	--	--	--

TABLE 3.7.1

SAMPLE TYPES AND ANALYSES/RATIONALE FOR BUILDING 459

Sample Matrix	Analysis	Rationale
Soils		
Surface Samples	BNA Extractables	Fuel spills/releases
	Metals	Fuel spills/releases
	Pesticides/PCBs	
	Petroleum Hydrocarbons	
	Gradation	Describe fate and transport
	Permeability	Describe fate and transport
Split Spoon Samples	VOA	Fuel spills/releases
	Ethylene dibromide	Fuel spills/releases
	Petroleum Hydrocarbons	Fuel spills/releases
	BNA Extractables	Fuel spills/releases
	Metals	Fuel spills/releases
	Pesticides/PCBs	
Split Spoon and/or Thin-Walled Tube Samples	Gradation	Describe fate and transport
	Water Content/Dry Density	Affects treatment method
	Permeability	Describe fate and transport
	Nutrients	Effectiveness of in-situ biotreatment
	pH	Describe fate and transport
	TOC	Describe fate and transport
	Ash Content	Evaluate remedial response options
	Btu Value	Evaluate remedial response options
	Chlorine Content	Evaluate remedial response options
Ground Water	VOA	Fuel spills/releases
	Ethylene Dibromide	Fuel spills/releases
	Petroleum Hydrocarbons	Fuel spills/releases
	BNA Extractables	Fuel spills/releases
	Metals	Fuel spills/releases
	Pesticides/PCBs	
	Hardness	Affects treatment method
	TOC	Evaluate treatment options
	pH	Describe fate and transport
	Dissolved Oxygen	Describe fate and transport
	Specific Conductance	Describe fate and transport

TABLE 3.7.1

SAMPLE TYPES AND ANALYSES/RATIONALE FOR BUILDING 459
(Continued)

Sample Matrix	Analysis	Rationale
Air	VOA	Fuel spills/releases
	BTX	Fuel spills/releases

Notes:

1. VOA indicates volatile organic analysis.
2. BNA indicates base, neutral, and acid.
3. TOC indicates total organic carbon.
4. Btu indicates British thermal unit.
5. PCBs indicates polychlorinated biphenyls.
6. BTX indicates benzene, toluene, and xylene.

TABLE 3.7.2

NUMBER AND TYPE OF SAMPLES TO BE COLLECTED AT SITE 459

Boring No.	Total Depth (ft)	Total Soil Samples	Surface Soil Samples	Split Spoon Samples	Thin-Walled Samples	Install Monitoring Well	Sample Ground Water
B459-1	15	6	1	5	--	MW459-1	Yes
B459-2	15	6	1	5	--	MW459-2	Yes
B459-3	15	6	1	3	2	MW459-3	Yes
B459-4	15	6	1	3	2	MW459-4	Yes
B459-5	15	6	1	3	2	--	--
B459-6	15	6	1	3	2	--	--
B459-7	15	6	1	3	2	--	--
ERM (MW)		--	--	--	--	--	Yes
ERM (MW)		--	--	--	--	--	Yes
ERM (MW)		--	--	--	--	--	Yes

Notes:

1. ERM (MW) refers to an existing monitoring well installed by ERM West (1987).

TABLE 3.8.1

SAMPLE TYPES AND ANALYSES/RATIONALE FOR BUILDING 547

Sample Matrix	Analysis	Rationale
Soils		
Surface Samples	BNA extractables	Fuel leaks
	Metals	
	Pesticides/PCBs	
	Petroleum Hydrocarbons	
	Gradation	Describe fate and transport
	Permeability	Describe fate and transport
Split Spoon Samples	VOA	Fuel leaks
	BNA extractables	
	Petroleum Hydrocarbons	Fuel leaks
	Pesticides/PCBs	
	Ethylene Dibromide	Fuel leaks
	Metals	
Split Spoon and/or Thin-Walled Tube Samples	Gradation	Describe fate and transport
	Water Content/ Dry Density	Affects treatment method
	Permeability	Describe fate and transport
	Nutrients	Effectiveness of in-situ biodegradation
	pH	Describe fate and transport
	TOC	Describe fate and transport
	Ash Content	Evaluate remedial response options
	Btu Value	Evaluate remedial response options
	Chlorine Content	Evaluate remedial response options
Ground Water	Petroleum Hydrocarbons	Fuel leaks
	VOA	Fuel leaks
	Metals	
	Pesticides/PCBs	
	BNA extractables	Fuel leaks
	Ethylene dibromide	Fuel leaks
	Hardness	Affects treatment method
	TOC	Evaluate treatment options
	pH	Describe fate and transport
	Dissolved Oxygen	Describe fate and transport
	Specific Conductance	Describe fate and transport

TABLE 3.8.1

SAMPLE TYPES AND ANALYSES/RATIONALE FOR BUILDING 547
(Continued)

Sample Matrix	Analysis	Rationale
Air	VOA	Fuel leaks
	BTX	Fuel leaks

Notes:

1. TOC indicates total organic carbon.
2. Btu indicates British thermal unit.
3. VOA indicates volatile organic analysis.
4. BNA indicates base, neutral, and acid.
5. PCBs indicates polychlorinated biphenyls.
6. BTX indicates benzene, toluene, and xylene.

TABLE 3.8.2

NUMBER AND TYPE OF SAMPLES TO BE COLLECTED AT SITE 547

Boring No.	Total Depth (ft)	Total Soil Samples	Surface Soil Samples	Split Spoon Samples	Thin-Walled Samples	Install Monitoring Well	Sample Ground Water
B547-1	15	6	1	5	0	MW547-1	Yes
B547-2	15	6	1	4	1	MW547-2	Yes
B547-3	15	6	1	4	1	MW547-3	Yes
B547-4	15	6	1	4	1	MW547-4	Yes
B547-5	15	6	1	4	1	MW547-5	Yes
B547-6	15	6	1	4	1	--	--
B547-7	15	6	1	4	1	--	--
B547-8	15	6	1	4	1	--	--
B547-9	15	6	1	4	1	--	--
B547-10	15	6	1	4	1	--	--

TABLE 3.9.1

SAMPLE TYPES AND ANALYSES/RATIONALE FOR BUILDING 162

Sample Matrix	Analysis	Rationale
Soils		
Surface Samples	BNA Extractables	Fuel leaks
	Metals	Fuel leaks
	Pesticides/PCBs	Fuel leaks
	Petroleum Hydrocarbons	
	Gradation	Describe fate and transport
	Permeability	Describe fate and transport
Split Spoon Samples	Petroleum Hydrocarbons	Fuel leaks
	VOA	Fuel leaks
	BNA Extractables	Fuel leaks
	Ethylene Dibromide	Fuel leaks
	Metals	
	Pesticides/PCBs	
Split Spoon and/or Thin-Walled Tube Samples	Gradation	Describe fate and transport
	Water Content/Dry Density	Affects treatment method
	Permeability	Describe fate and transport
	Nutrients	Effectiveness of in-situ biodegradation
	pH	Describe fate and transport
	TOC	Describe fate and transport
	Ash Content	Evaluate remedial response
	Btu Value	Evaluate remedial response
	Chlorine Content	Evaluate remedial response
Ground Water	VOA	Fuel leaks
	BNA Extractable	Fuel leaks
	Ethylene Dibromide	Fuel leaks
	Metals	Fuel leaks
	Petroleum Hydrocarbons	
	Pesticides/PCBs	
	General Minerals	Evaluate water quality and seawater intrusion
	Hardness	Affects treatment method
	TOC	Evaluate treatment options
	pH	Describe fate and transport
	Dissolved Oxygen	Describe fate and transport
	Specific Conductance	Describe fate and transport

TABLE 3.9.1

SAMPLE TYPES AND ANALYSES/RATIONALE FOR BUILDING 162
(Continued)

Sample Matrix	Analysis	Rationale
Air	VOA	Fuel leaks
	BTX	Fuel leaks

Notes:

1. TOC indicates total organic carbon.
2. Btu indicates British thermal unit.
3. VOA indicates volatile organic analysis
4. BNA indicates base, neutral, and acid.
5. PCBs indicates polychlorinated biphenyls.
6. BTX indicates benzene, toluene, and xylene.

TABLE 3.9.2

NUMBER AND TYPE OF SAMPLES TO BE COLLECTED AT SITE 162

Boring No.	Total Depth (ft)	Total Soil Samples	Surface Soil Samples	Split Spoon Samples	Thin-Walled Samples	Install Monitoring Well	Sample Ground Water
B162-1	15	6	1	5	--	--	--
B162-2	15	6	1	5	--	--	--
B162-3	15	6	1	5	0	MW162-3	Yes
OW-21[a]	--	--	--	--	--	(Kennedy, 1980)	Yes
OW-2[a]	--	--	--	--	--	(Kennedy, 1980)	Yes
WA-8[a]	--	--	--	--	--	(Wahler, 1985)	Yes

Notes:

[a]Previously installed wells to be sampled.

TABLE 3.10.1

SAMPLE TYPES AND ANALYSES/RATIONALE FOR BUILDING 114

Sample Matrix	Analysis	Rationale
Soils		
Surface Samples	BNA Extractables	Paint operations
	Metals	Possible mercury contamination
	Mercury	Possible mercury contamination
	Pesticides/PCBs	Pest and weed control
	Gradation	Describe fate and transport
	Permeability	Describe fate and transport
	Herbicides	Pest and weed control
	Organophosphorus Pesticides	Pest and weed control
Split Spoon Samples	VOA	Paint operations
	BNA Extractables	Paint operations
	Metals	Possible mercury contamination
	Mercury	Possible mercury contamination
	Pesticides/PCBs	Pest and weed control
	Organophosphorus Pesticides	Pest and weed control
	Herbicides	Pest and weed control
	pH	Describe fate and transport
	TOC	Describe fate and transport
	Water Content/ Dry Density	Affects treatment method
	Permeability	Describe fate and transport
Ground Water	VOA	Paint operations
	BNA Extractables	Paint operations
	Metals	Possible mercury contamination
	Mercury	Possible mercury contamination
	Pesticides/PCBs	Pest and weed control
	Herbicides	Pest and weed control
	Organophosphorus	Pest and weed control
	Pesticides	Pest and weed control
	pH	Describe fate and transport
	Dissolved Oxygen	Describe fate and transport
	TOC	Describe fate and transport

Notes:

1. VOA indicates volatile organic analysis.
2. BNA indicates base, neutral, and acid.
3. PCBs indicates polychlorinated biphenyls.
4. TOC indicates total organic carbon.

TABLE 3.10.2

NUMBER AND TYPE OF SAMPLES TO BE COLLECTED AT SITE 114

Boring No.	Total Depth (ft)	Total Soil Samples	Surface Soil Samples	Split Spoon Samples	Thin-Walled Samples	Install Monitoring Well	Sample Ground Water
B114-1	15	6	1	5	--	MW114-1	Yes
B114-2	15	6	1	5	--	MW114-2	Yes
B114-3	15	6	1	5	--	MW114-3	Yes
B114-4	15	6	1	4	1	MW114-4	Yes
B114-5	15	6	1	5	--	MW114-5	Yes
B114-6	15	6	1	5	--	--	--
B114-7	15	6	1	5	--	--	--
B114-8	15	6	1	4	1	--	--
B114-9	15	6	1	5	--	--	--
B114-10	15	6	1	5	--	--	--
B114-11	15	6	1	5	--	--	--
B114-12	15	6	1	5	--	--	--

TABLE 3.11.1

SAMPLE TYPES AND ANALYSES/RATIONALE FOR BUILDING 410

Sample Matrix	Analysis	Rationale
Soils		
Surface Samples	BNA Extractables Metals	Wastewater constituents: oil, metals, paints
	Gradation	Describe fate and transport
	Permeability	Describe fate and transport
Split Spoon Samples	VOA BNA Extractables Metals	Waste water constituents: oil, metals, paints
Split Spoon and/or Thin-Walled Samples	Gradation	Describe fate and transport
	Modified Proctor Compaction	Evaluate disposal options
	Water Content/Dry Density	Affects treatment method
	Specific Gravity	Indicates density
	One-Dimensional Consolidation	Evaluate disposal options
	Permeability	Describe fate and transport
	pH	Describe fate and transport
	CEC	Determines mobility of metals
	TOC	Describe fate and transport
Ground Water	VOA BNA Extractables Metals	Wastewater constituents: oils, metals, paints
	General Minerals	Evaluate water quality and seawater intrusion
	Hardness	Affects treatment method
	Alkalinity	General treatment information
	TDS	General treatment information
	TOC	Evaluate treatment information
	pH	Describe fate and transport
	Dissolved Oxygen	Describe fate and transport
	Acidity	General treatment information
	Specific Conductance	Describe fate and transport

TABLE 3.11.1

SAMPLE TYPES AND ANALYSES/RATIONALE FOR BUILDING 410
(Continued)

Sample Matrix	Analysis	Rationale
Air	VOA Metals	Wastewater constituents: oils, metals, paints

Notes:

1. VOA indicates volatile organic analysis.
2. BNA indicates base, neutral, and acid.
3. CEC indicates cation-exchange capacity.
4. TOC indicates total organic carbon.
5. TDS indicates total dissolved solids.

TABLE 3.11.2

NUMBER AND TYPE OF SAMPLES TO BE COLLECTED AT SITE 410

Boring No.	Total Depth (ft)	Total Soil Samples	Surface Soil Samples	Split Spoon Samples	Thin-Walled Samples	Install Monitoring Well	Sample Ground Water
B410-1	15	6	1	4	1	MW410-1	Yes
B410-2	15	6	1	5	--	MW410-2	Yes
B410-3	15	6	1	4	1	MW410-3	Yes
B410-4	15	6	1	5	--	MW410-4	Yes
B410-5	15	6	1	5	--	--	--
B410-6	15	6	1	4	1	--	--
B410-7	15	6	1	5	--	--	--
B410-8	15	6	1	5	--	--	--
B410-9	15	6	1	5	--	--	--

TABLE 3.12.1

SAMPLE TYPES AND ANALYSES/RATIONALE FOR BUILDING 530

Sample Matrix	Analysis	Rationale
Soils		
Surface Samples	BNA Extractables Metals	Wastewater constituents: solvents, heavy metals, phenols
	Gradation	Describe fate and transport
	Permeability	Describe fate and transport
Split Spoon Samples	VOA	Oil refinery waste
	BNA Extractables	Oil refinery waste
	Petroleum Hydrocarbons	Oil refinery waste
	Metals	Wastewater characteristics: solvents, heavy metals, phenols
	pH	Describe fate and transport
	TOC	Describe fate and transport
	Water Content/Dry Density	Affects treatment method
	Permeability	Describe fate and transport
Ground Water	VOA BNA Extractables Metals	Wastewater constituents: solvents, heavy metals, phenols
	Petroleum Hydrocarbons	Oil refinery waste
	Oil and Grease	Oil refinery waste
	General Minerals	Evaluate water quality and seawater intrusion
	pH	Describe fate and transport
	TOC	Describe fate and transport
	Dissolved Oxygen	Describe fate and transport
Air	VOA	Oil refinery waste
	Metals	Wastewater constituents

Notes:

1. VOA indicates volatile organic analysis.
2. BNA indicates base, neutral, and acid.
3. TOC indicates total organic carbon.

TABLE 3.12.2

NUMBER AND TYPE OF SAMPLES TO BE COLLECTED AT SITE 530

Boring No.	Total Depth (ft)	Total Soil Samples	Surface Soil Samples	Split Spoon Samples	Thin-Walled Samples	Install Monitoring Well	Sample Ground Water
B530-1	15	6	1	5	--	MW530-1	Yes
B530-2	15	6	1	4	1	MW530-2	Yes
B530-3	15	6	1	4	1	MW530-3	Yes

TABLE 3.13.1

SAMPLE TYPES AND ANALYSES/RATIONALE FOR BUILDING 400

Sample Matrix	Analysis	Rationale
Soils		
Surface Samples	BNA Extractables Metals	Wastewater characteristics: solvents, heavy metals, phenols
	Gradation	Describe fate and transport
	Permeability	Describe fate and transport
Split Spoon Samples	VOA BNA Extractables Metals	Wastewater characteristics: solvents, heavy metals, phenols
	pH	Describe fate and transport
	TOC	Describe fate and transport
	Water Content/ Dry Density	Affects treatment method
	Permeability	Describe fate and transport
Ground Water	VOA BNA Extractables Metals	Wastewater constituents: solvents, heavy metals, phenols
	General Minerals	Evaluate water quality and seawater intrusion
	pH	Describe fate and transport
	TOC	Describe fate and transport
	Dissolved Oxygen	Describe fate and transport
Air	VOA Metals	Wastewater constituents: solvents, heavy metals, phenols

Notes:

1. BNA indicates base, neutral, and acid.
2. VOA indicates volatile organic analysis.
3. TOC indicates total organic carbons.

TABLE 3.13.2

NUMBER AND TYPE OF SAMPLES TO BE COLLECTED AT SITE 400

Boring No.	Total Depth (ft)	Total Soil Samples	Surface Soil Samples	Split Spoon Samples	Thin-Walled Samples	Install Monitoring Well	Sample Ground Water
B400-1	15	6	1	5	--	MW400-1	Yes
B400-2	15	6	1	5	--	MW400-2	Yes
B400-3	15	6	1	4	1	MW400-3	Yes
B400-4	15	6	1	4	1	--	--

TABLE 3.14.1

SAMPLE TYPES AND ANALYSES/RATIONALE FOR BUILDING 14

Sample Matrix	Analysis	Rationale
Soils		
Surface Samples	Gradation	Describe fate and transport
	Permeability	Describe fate and transport
Split Spoon Samples	Petroleum Hydrocarbons	Engine testing
	VOA	Engine testing
	BNA extractables	Engine testing
	Metals	Engine testing
	Mercury	Engine testing
	Ethylene Dibromide	
	pH	Describe fate and transport
	TOC	Describe fate and transport
	Water Content/Dry Density	Affects treatment method
	Permeability	Describe fate and transport
Ground Water		
	Petroleum Hydrocarbons	Engine testing
	VOA	Engine testing
	BNA extractables	Engine testing
	Metals	Engine testing
	Mercury	Engine testing
	Ethylene Dibromide	
	General Minerals	Evaluate water quality and seawater intrusion
	pH	Describe treatment method
	TOC	Describe treatment method
	Dissolved Oxygen	Describe treatment method

Notes:

1. VOA indicates volatile organic analysis.
2. BNA indicates base, neutral, and acid.
3. TOC indicates total organic carbon.

TABLE 3.14.2

NUMBER AND TYPE OF SAMPLES TO BE COLLECTED AT SITE 14

Boring No.	Total Depth (ft)	Total Soil Samples	Surface Soil Samples	Split Spoon Samples	Thin-Walled Samples	Install Monitoring Well	Sample Ground Water
B14-1	15	6	1	5	--	MW14-1	Yes
B14-2	15	6	1	5	--	MW14-2	Yes
B14-3	15	6	1	5	--	MW14-3	Yes
B14-4	15	6	1	5	--	MW14-4	Yes
B14-5	15	6	1	2	3	--	--
B14-6	15	6	1	3	2	--	--
B14-7	15	6	1	5	--	--	--

TABLE 3.15.1

SAMPLE TYPES AND ANALYSES/RATIONALE FOR BUILDING 10

Sample Matrix	Analysis	Rationale
Soils		
Surface Samples	BNA Extractables	Bunker "C" fuel present
	Metals	Bunker "C" fuel present
	Pesticides/PCBs	Bunker "C" fuel present
	Petroleum Hydrocarbons	
	Gradation	Describe fate and transport
	Permeability	Describe fate and transport
Split Spoon Samples	Petroleum Hydrocarbons	Bunker "C" fuel present
	VOA	Bunker "C" fuel present
	BNA Extractables	Bunker "C" fuel present
	Metals	Bunker "C" fuel present
	Pesticides/PCBs	Bunker "C" fuel present
	Ethylene Dibromide	Bunker "C" fuel present
Split Spoon and/or Thin-Walled Tube Samples	Gradation	Describe fate and transport
	Water Content/ Dry Density	Affects treatment method
	Specific Gravity	Indicates density
	Permeability	Describe fate and transport
	Nutrients	Effectiveness of in-situ biotreatment
	pH	Describe fate and transport
	TOC	Describe fate and transport
	Ash Content	Evaluate remedial response options
	Btu Value	Evaluate remedial response options
	Chlorine Content	Evaluate remedial response options
Ground Water	VOA	Bunker "C" fuel present
	BNA Extractables	Bunker "C" fuel present
	Metals	Bunker "C" fuel present
	Pesticides/PCBs	Bunker "C" fuel present
	Ethylene Dibromide	Bunker "C" fuel present
	Petroleum Hydrocarbons	
	General Minerals	Evaluate water quality and seawater intrusion
	TDS	General treatment information
	TOC	Evaluate treatment information
	pH	Describe fate and transport
	Dissolved Oxygen	Describe fate and transport
	Specific Conductance	Describe fate and transport

TABLE 3.15.1

SAMPLE TYPES AND ANALYSES/RATIONALE FOR BUILDING 10
(Continued)

Sample Matrix	Analysis	Rationale
Air	VOA	Bunker "C" fuel present
	BTX	Bunker "C" fuel present

Notes:

1. TOC indicates total organic carbon.
2. Btu indicates British thermal unit.
3. VOA indicates volatile organic acid.
4. BNA indicates base, neutral, and acid.
5. TDS indicates total dissolved solids.
6. PCBs indicates polychlorinated biphenyls.
7. BTX indicates benzene, toluene, and xylene.

TABLE 3.15.2

NUMBER AND TYPE OF SAMPLES TO BE COLLECTED AT SITE 10

Boring No.	Total Depth (ft)	Total Soil Samples	Surface Soil Samples	Split Spoon Samples	Thin-Walled Samples	Install Monitoring Well	Sample Ground Water
B10-1	15	6	1	5	--	MW10-1	Yes
B10-2	15	6	1	4	1	MW10-2	Yes
B10-3	15	6	1	5	--	MW10-3	Yes
B10-4	15	6	1	4	1	MW10-4	Yes
B10-5	15	6	1	5	--	--	--
B10-6	15	6	1	4	1	--	--
B10-7	15	6	1	5	--	--	--
B10-8	15	6	1	5	--	--	--
B10-9	15	6	1	5	--	--	--
B10-10	15	6	1	5	--	--	--

TABLE 3.16.1

SAMPLE TYPES AND ANALYSES/RATIONALE FOR OIL REFINERY

Sample Matrix	Analysis	Rationale
Soils		
Surface Samples	BNA extractables	Oil refinery waste
	Metals	Oil refinery waste
	PCBs	Oil refinery waste
	Gradation	Describe fate and transport
	Permeability	Describe fate and transport
Split Spoon Samples	Petroleum Hydrocarbons	Oil refinery waste
	BNA extractables	Oil refinery waste
	VOA	Oil refinery waste
	Metals	Oil refinery waste
	Pesticides/PCBs	Oil refinery waste
Split Spoon and/or Thin-Walled Samples	Gradation	Disposal, treatment, isolation
	Atterberg Limits	Disposal, treatment, isolation
	Modified Proctor Compaction	Evaluate disposal options
	Water Content/Dry Density	Affects treatment method
	Specific Gravity	Indicates density
	One-Dimensional Consolidation	Evaluate disposal options
	Permeability	Describe fate and transport
	Nutrients	Effectiveness of in-situ biotreatment
	pH	Describe fate and transport
	TOC	Describe fate and transport
	Ash Content	Evaluate remedial response options
	Btu Value	Evaluate remedial response options
	Chlorine	Evaluate remedial response options
Ground Water	VOA	Oil refinery waste
	BNA extractables	Oil refinery waste
	Metals	Oil refinery waste
	Pesticides/PCBs	Oil refinery waste
	Petroleum Hydrocarbons	Oil refinery waste
	TDS	General treatment information
	pH	Describe fate and transport
	Dissolved Oxygen	Describe fate and transport
	TOC	Evaluate treatment information
	Specific Conductance	Describe fate and transport

TABLE 3.16.1

SAMPLE TYPES AND ANALYSES/RATIONALE FOR OIL REFINERY
(Continued)

Sample Matrix	Analysis	Rationale
Air	BNA extractables	Oil refinery waste
	VOA	Oil refinery waste
	Metals	Oil refinery waste
	Pesticides/PCBs	Oil refinery waste

Notes:

1. VOA indicates volatile organic analysis.
2. TOC indicates total organic carbon.
3. Btu indicates British thermal unit.
4. TDS indicates total dissolved solids.
5. PCBs indicates polychlorinated biphenyls.
6. BNA indicates base, neutral, and acid.

TABLE 3.16.2

NUMBER AND TYPE OF SAMPLES TO BE COLLECTED AT OIL REFINERY SITE

Boring No.	Total Depth (ft)	Total Soil Samples	Surface Soil Samples	Split Spoon Samples	Thin-Walled Samples	Install Monitoring Well	Sample Ground Water
BOR-1	15	6	1	4	1	MWOR-1	Yes
BOR-2	15	6	1	4	1	MWOR-2	Yes
BOR-3	15	6	1	4	1	MWOR-3	Yes
BOR-4	15	6	1	4	1	MWOR-4	Yes
BOR-5	15	6	1	4	1	MWOR-5	Yes
BOR-6	15	6	1	4	1	--	--
BOR-7	15	6	1	4	1	--	--
BOR-8	15	6	1	4	1	--	--
BOR-9	15	6	1	4	1	--	--
BOR-10	15	6	1	4	1	--	--
BOR-11	15	6	1	4	1	--	--
BOR-12	15	6	1	4	1	--	--
BOR-13	15	6	1	4	1	--	--
BOR-14	15	6	1	4	1	--	--
BOR-15	15	6	1	4	1	--	--
BOR-16	15	6	1	4	1	--	--
BOR-17	15	6	1	4	1	--	--
BOR-18	15	6	1	4	1	--	--
BOR-19	15	6	1	4	1	--	--
BOR-20	15	6	1	4	1	--	--
BOR-21	15	6	1	4	1	--	--
BOR-22	15	6	1	4	1	--	--
BOR-23	15	6	1	4	1	--	--

TABLE 3.16.2

NUMBER AND TYPE OF SAMPLES TO BE COLLECTED AT OIL REFINERY SITE
(Continued)

Boring No.	Total Depth (ft)	Total Soil Samples	Surface Soil Samples	Split Spoon Samples	Thin-Walled Samples	Install Monitoring Well	Sample Ground Water
BOR-24	15	6	1	4	1	--	--
BOR-25	15	6	1	4	1	--	--
BOR-26	15	6	1	4	1	--	--
BOR-27	15	6	1	4	1	--	--

TABLE 3.17.1

SAMPLE TYPES AND ANALYSES/RATIONALE FOR FIRE TRAINING AREA

Sample Matrix	Analysis	Rationale
Soils		
Surface Samples	BNA extractables	Fuel
	Metals	Heavy metals in fuels
	Pesticides/PCBs	Waste oils
	Petroleum Hydrocarbons	
	Dioxins/Furans	Waste oils
	Gradation	Describe fate and transport
	Permeability	Describe fate and transport
Split Spoon Samples	VOA	Bowser fuels
	Petroleum Hydrocarbons	Fuels
	BNA Extractables	Fuels
	Metals	Heavy metals in fuels
	Pesticides/PCBs	Waste oils
	Ethylene dibromide	Fuels
	pH	Describe fate and transport
	TOC	Describe fate and transport
	Water Content/Dry Density	Affects treatment method
	Permeability	Describe fate and transport
Ground Water	VOA	Bowser fuels
	BNA Extractables	Fuels
	Oil and Grease	Waste oils
	Petroleum Hydrocarbons	Heavy metals in fuels
	Metals	Waste oils
	General Minerals	Evaluate water quality and seawater intrusion
	Pesticides/PCBs	
	pH	Describe fate and transport
	TOC	Describe fate and transport
	Dissolved Oxygen	Describe fate and transport
Air	VOA	Bowser fuels
	BNA extractables	Fuels
	Metals	Heavy metals in fuels
	Pesticides/PCBs	Waste oils

Notes:

1. VOA indicates volatile organic analysis.
2. BNA indicates base, neutral, and acid.
3. PCBs indicates polychlorinated biphenyls.
4. TOC indicates total organic carbon.

TABLE 3.17.2

NUMBER AND TYPE OF SAMPLES TO BE COLLECTED AT THE FIRE-TRAINING AREA SITE

Boring No.	Total Depth (ft)	Total Soil Samples	Surface Soil Samples	Split Spoon Samples	Thin-Walled Samples	Install Monitoring Well	Sample Ground Water
Grid Samples	0.5	45	45	--	--	--	--
BFT-1	15	6	1	4	1	MWFT-1	Yes
BFT-2	15	6	1	4	1	MWFT-2	Yes
BFT-3	15	6	1	4	1	MWFT-3	Yes

TABLE 3.18.1

SAMPLE TYPES AND ANALYSES/RATIONALE FOR BUILDINGS 301 AND 389

Sample Matrix	Analysis	Rationale
Soils		
Surface Samples	Metals	PCB waste oil present
	Pesticides/PCBs	PCB waste oil present
	BNA extractables	PCB waste oil present
	Gradation	Describe fate and transport
	Permeability	Describe fate and transport
Split Spoon Samples	VOA	PCB waste oil present
	BNA Extractables	PCB waste oil present
	Metals	PCB waste oil present
	Pesticides/PCBs	PCB waste oil present
Split Spoon and/or Thin-Walled Tube Samples	Gradation	Describe fate and transport
	Water Content/Dry Density	Affects treatment method
	Specific Gravity	Indicates density
	Permeability	Describe fate and transport
	pH	Describe fate and transport
	TOC	Describe fate and transport
	Ash Content	Evaluate remedial response options
	Btu Value	Evaluate remedial response options
	Chlorine Content	Evaluate remedial response options
Ground Water	VOA	PCB waste oil present
	BNA Extractables	PCB waste oil present
	Metals	PCB waste oil present
	Pesticides/PCBs	PCB waste oil present
	Petroleum Hydrocarbons	PCB waste oil present
	General Minerals	Evaluate water quality and seawater intrusion
	Hardness	Affects treatment method
	TDS	General treatment information
	pH	Describe fate and transport
	Dissolved Oxygen	Describe fate and transport
	TOC	Evaluate treatment information
	Specific Conductance	Describe fate and transport

TABLE 3.18.1

SAMPLE TYPES AND ANALYSES/RATIONALE FOR BUILDINGS 301 AND 389
(Continued)

Sample Matrix	Analysis	Rationale
Air	Metals	PCB waste oil present
	Pesticides/PCBs	PCB waste oil present

Notes:

1. PCBs indicates polychlorinated biphenyls.
2. VOC indicates volatile organic analysis.
3. BNA indicates base, neutral, and acid.
4. TOC indicates total organic carbon.
5. TDS indicates total dissolved solids.
6. Btu indicates Bristish thermal unit.

TABLE 3.18.2

NUMBER AND TYPE OF SAMPLES TO BE COLLECTED AT SITE
OF BUILDINGS 301 AND 389

Boring No.	Total Depth (ft)	Total Soil Samples	Surface Soil Samples	Split Spoon Samples	Thin-Walled Samples	Install Monitoring Well	Sample Ground Water
Grid Samples	0.5	55	55	--	--	--	--
B301-1	15	6	1	4	1	MW 301-1	Yes
B301-2	15	6	1	4	1	MW 301-2	Yes
B301-3	15	6	1	4	1	MW 301-3	Yes

TABLE 3.19.1

SAMPLE TYPES AND ANALYSES/RATIONALE FOR CANS C-2 AREA

Sample Matrix	Analysis	Rationale
Soils		
Surface Samples	Metals	Previous sampling revealed high levels
	Total Cyanides	Possible association with metals
	Pesticides/PCBs	Herbicides found as well
	Herbicides	Used for weed control detected during previous sampling
	BNA Extractables	Storage of acids and bases
	Gradation	Describe fate and treatment
	Permeability	Describe fate and treatment
Split Spoon Samples	VOA	Storage of paints and solvents
	BNA Extractables	Storage of acids and bases
	Metals	Previous sampling revealed high levels
	Total Cyanides	Possible association with metals
	Pesticides/PCBs	Herbicides found
Split Spoon and/or Thin-Walled Tube Samples	Gradation	Disposal, treatment, isolation
	Atterberg Limits	Disposal, treatment, isolation
	Modified Proctor Compaction	Evaluate disposal options
	Water Content/Dry Density	Affects treatment method
	Specific Gravity	Indicates density
	One-Dimensional Consolidation	Evaluate disposal options
	Permeability	Describe fate and transport
	Nutrients	Effectiveness of in-situ biotreatment
	pH	Describe fate and transport
	CEC	Indicates mobility of metals
	TOC	Describe fate and transport
	Ash Content	Evaluate remedial response options
	Btu Value	Evaluate remedial response options
	Chlorine Content	Evaluate remedial response options
Ground Water	VOA	Storage of paints and solvents
	BNA Extractables	Storage of acids and bases
	Metals	Previous sampling revealed high levels
	Total Cyanides	Possible association with metals
	Pesticides/PCBs	Herbicides found
	Petroleum Hydrocarbons	Oil refinery waste
	General Minerals	Evaluate water quality and seawater intrusion

TABLE 3.19.1

SAMPLE TYPES AND ANALYSES/RATIONALE FOR CANS C-2 AREA
(Continued)

Sample Matrix	Analysis	Rationale
Ground Water (Continued)		
	Alkalinity	General treatment information
	TDS	General treatment information
	TOC	Evaluate treatment information
	pH	Describe fate and transport
	Dissolved Oxygen	Describe fate and transport
	Acidity	General treatment information
	Specific Conductance	Describe fate and transport
	Hardness	General treatment information
Air	VOA	Storage of paints and solvents
	BNA Extractables	Storage of acids and bases
	Metals	Hazardous waste storage area
	Pesticides/PCBs	Hazardous waste storage ares

Notes:

1. PCBs indicates polychlorinated biphenyls.
2. VOA indicates volatile organic analysis.
3. BNA indicates base, neutral, and acid.
4. CEC indicates cation-exchange capacity.
5. TOC indicates total organic carbon.
6. Btu indicates British thermal unit.
7. TDS indicates total dissolved solids.

TABLE 3.19.2

NUMBER AND TYPE OF SAMPLES TO BE COLLECTED AT SITE CANS C-2

Boring No.	Total Depth (ft)	Total Soil Samples	Suface Soil Samples	Split Spoon Samples	Thin-Walled Samples	Install Monitoring Well	Sample Ground Water
BC2-1	15	6	1	5	--	MWC2-1	Yes
BC2-2	15	6	1	5	--	MWC2-2	Yes
BC2-3	15	6	1	5	--	MWC2-3	Yes
BC2-4	15	6	1	3	2	--	--
BC2-5	15	6	1	2	3	--	--
BC2-6	15	6	1	3	2	--	--
BC2-7	15	6	1	3	2	--	--
BC2-8	15	6	1	3	2	--	--
BC2-9	15	6	1	3	2	--	--
WA-6	(Wahler, 1985)	--	--	--	--	Yes	
Hand-Augered Samples	0.5	Approx. 55		--	--	--	--

TABLE 3.20.1

SAMPLE TYPES AND ANALYSES/RATIONALE FOR SEAPLANE LAGOON

Sample Matrix	Analysis	Rationale
Soils		
Sediment Samples	Metals Mercury Tin or Tributyltin VOA BNA Extractables Pesticides/PCBs	Due to the hazardous character of the waste streams entering the lagoon
	Gradation	Disposal, treatment, isolation
	Atterberg Limits	Disposal, treatment, isolation
	Permeability	Describe fate and transport
	Modified Proctor Compaction	Evaluate disposal options
	Specific Gravity	Indicates density
	One-Dimensional Consolidation	Evaluate disposal options
	pH	Describe fate and transport
	TOC	Describe fate and transport
	Bioassay	Determine toxicity to marine macrobenthos
Surface Water	Metals Mercury VOA BNA Extractables Oil and grease Pesticides/PCBs	Due to the hazardous character of the waste streams entering the lagoon
	COD	General water characteristics
	BOD	General water characteristics
	pH	Describe fate and transport
	TOC	Describe fate and transport
	Dissolved Oxygen	Describe fate and transport
Fish	VOA BNA Extractables Pesticides/PCBs Metals	Due to the hazardous character of the waste streams entering the lagoon.

Notes:
1. VOA indicates volatile organic analysis.
2. BNA indicates base, neutral, and acid.
3. PCBs indicates polychlorinated biphenyls.
4. COD indicates chemical oxygen demand.
5. BOD indicates biological oxygen demand.
6. TOC indicates total organic carbon.

TABLE 3.20.2

TYPE AND NUMBER OF SAMPLES TO BE COLLECTED
FROM THE SEAPLANE LAGOON

Sample Type	Number of Samples
Sediment	27
Bioassay Sediment	11
Surface Water	29
Fish (tissue residue)	8
Background Fish (tissue residue)	8
Background bioassay sediment	4

TABLE 3.21.1

SAMPLE TYPES AND ANALYSES/RATIONALE FOR STATION SEWER SYSTEM

Sample Matrix	Analysis	Rationale
Soils		
Split Spoon Samples	VOA BNA Extractables Metals Mercury Petroleum Hydrocarbons	Appears likely that untreated and treated hazardous substances and rinse waters may have entered the sewer systems
	pH	Describe fate and transport
	TOC	Describe fate and transport
	Gradation	Describe fate and transport
	Permeability	Describe fate and transport
Ground Water	VOA BNA Extractables Metals Mercury Petroleum Hydrocarbons	Appears likely that untreated and treated hazardous substances and rinse waters may have entered the sewer systems
	pH	Describe fate and transport
	TOC	Describe fate and transport
	Dissolved Oxygen	Describe fate and transport

Notes:

1. VOA indicates volatile organic analysis.
2. BNA indicates base, neutral, and acid.
3. TOC indicates total organic carbon.

TABLE 3.22.1

SAMPLE TYPES AND ANALYSES/RATIONALE FOR YARD D-13

Sample Matrix	Analysis	Rationale
Soils		
Surface Samples	BNA Extractables	Hazardous waste storage area
	Metals	Hazardous waste storage area
	Total Cyanides	Hazardous waste storage area
	Pesticides/PCBs	Hazardous waste storage area
	Gradation	Disposal treatment isolation
	Permeability	Describe fate and transport
Split Spoon Samples	VOA	Hazardous waste storage area
	BNA Extractables	Hazardous waste storage area
	Metals	Hazardous waste storage area
	Total Cyanides	Hazardous waste storage area
	Pesticides/PCBs	Hazardous waste storage area
	Petroleum Hydrocarbons	Oil refinery
Split Spoon and/or Thin-Walled Tube Samples	Gradation	Disposal, treatment, isolation
	Atterberg Limits	Disposal, treatment, isolation
	Modified Proctor Compaction	Evaluate disposal options
	Water Content/Dry Density	Affects treatment method
	Specific Gravity	Indicates density
	One-Dimensional Consolidation	Evaluate disposal options
	Permeability	Describe fate and transport
	pH	Describe fate and transport
	CEC	Indicates mobility of metals
	TOC	Describe fate and transport
	Ash Content	Evaluate remedial response
	Btu Value	Evaluate remedial response
	Chlorine Content	Evaluate remedial response
Ground Water	VOA	Hazardous waste storage area
	BNA Extractables	Hazardous waste storage area
	Metals	Hazardous waste storage area
	Total Cyanides	Hazardous waste storage area
	Oil and Grease	Waste Oil
	Petroleum Hydrocarbons	Oil refinery
	Pesticides/PCBs	Hazardous waste storage area
	General Minerals	Evaluate water quality and seawater intrusion
	Hardness	Affects treatment method
	Alkalinity	General treatment information
	TDS	General treatment information
	TOC	Evaluate treatment information
	pH	Describe fate and transport

TABLE 3.22.1

SAMPLE TYPES AND ANALYSES/RATIONALE FOR YARD D-13
(Continued)

Ground Water (Continued)	Dissolved Oxygen	Describe fate and transport
	Acidity	General treatment information
	Specific Conductance	Describe fate and transport
Air	VOA	Hazardous waste storage area

Notes:

1. VOA indicates volatile organic analysis.
2. BNA indicates base, neutral, and acid.
3. CEC indicates cation-exchange capacity.
4. TOC indicates total organic carbon.
5. Btu indicates British thermal unit.
6. TDS indicates total dissolved solids.
7. PCBs indicates polychlorinated biphenyls.

TABLE 3.22.2

NUMBER AND TYPE OF SAMPLES TO BE COLLECTED AT YARD D-13

Boring No.	Total Depth (ft)	Total Soil Samples	Surface Soil Samples	Split Spoon Samples	Thin-Walled Samples	Install Monitoring Well	Sample Ground Water
BD13-1	15	6	1	--	--	MWD13-1	Yes
BD13-2	15	6	1	--	--	MWD13-2	Yes
BD13-3	15	6	1	--	--	MWD13-3	Yes
BD13-4	15	6	1	--	--	MWD13-4	Yes
BD13-5	15	6	1	4	1	--	--
BD13-6	15	6	1	4	1	--	--
BD13-7	15	6	1	4	1	--	--
BD13-8	15	6	1	4	1	--	--
BD13-9	15	6	1	4	1	--	--
BD13-10	15	6	1	4	1	--	--
BD13-11	15	6	1	4	1	--	--
BD13-12	15	6	1	4	1	--	--
BD13-13	15	6	1	4	1	--	--
BD13-14	15	6	1	4	1	--	--
BD13-15	15	6	1	4	1	--	--
BD13-16	15	6	1	4	1	--	--

TABLE 3.23.1

SAMPLE TYPES AND ANALYSES/RATIONALE FOR THE ESTUARY

Sample Matrix	Analysis	Rationale
Soils		
Sediment Samples	Metals Mercury VOA BNA Extractables Pesticides/PCBs	Wastewater sampling has identified the constituents of concern
	pH	Describe fate and transport
	TOC	Describe fate and transport
	Gradation	Describe fate and transport
	Permeability	Describe fate and transport
	Bioassay	Determine toxicity to marine macrobenthos
Surface Water	VOA BNA Extractables Metals Oil and Grease Pesticides/PCBs	Wastewater sampling has identified the constituents of concern
	pH	Describe fate and transport
	TOC	Describe fate and transport
	Dissolved Oxygen	Describe fate and transport

Notes:

1. VOA indicates volatile organic analysis.
2. BNA indicates base, neutral, and acid.
3. PCBs indicates polychlorinated biphenyls.
4. TOC indicates total organic carbon.

TABLE 3.23.2

NUMBER AND TYPE OF SAMPLES TO BE
COLLECTED FROM THE ESTUARY

Sample Type	Number of Samples
Sediment	21
Bioassay Sediment	4
Surface Water	11

Note: Background bioassay sediment samples for the estuary will be covered by the background samples listed in Table 3.20.2.

TABLE 3.24.1

SAMPLE TYPES AND ANALYSES/RATIONALE FOR WETLAND AREA WEST OF SEAPLANE LAGOON

Sample Matrix	Analysis	Rationale
Sediment	VOA	Solvents/cleaning compounds
	BNA Extractables	Paints
	Metals	Scrap metals
	Pesticides/PCBs	Waste oils
	Oil and Grease	Waste oils
	TOC	Describe fate and transport
	Bioassays Bioaccumulation Studies	Elevated levels of contaminants with high bioconcentration factors
Surface Water	VOA	Solvents/cleaning compounds
	BNA Extractables	Paints
	Metals	Scrap metals
	Pesticides/PCBs	Waste oils
	Oil and Grease	Waste oils
	Hardness	Affects treatment method
	Salinity	Indicator parameter
	pH	Describe fate and transport
	TOC	Describe fate and transport
	Dissolved Oxygen	Describe fate and transport
Benthic Species	VOA BNA Extractables Pesticides/PCBs Metals	Due to the hazardous character of the waste streams possibly entering the site.

Notes:

1. VOA indicates volatile organic analysis.
2. BNA indicates base, neutral, and acid.
3. TOC indicates total organic carbon.
4. PCBs indicates polychlorinated biphenyls.

TABLE 3.24.2

NUMBER AND TYPE OF SAMPLES TO BE COLLECTED FROM WETLAND AREA

Sample Type	Number of Samples
Sediment	10
Bioassay Sediment	20
Surface Water	10

TABLE 3.25.1

SAMPLE TYPES AND ANALYSES FOR BACKGROUND SAMPLING ALONG EASTERN MARGINS OF 1943-56 DISPOSAL AREA AND WEST BEACH LANDFILL

Sample Matrix	Analysis
Soils	
Split Spoon Samples	VOA BNA Extractables Pesticides/PCBs Metals Mercury Gross Alpha and Beta U226 and U228 Asbestos Dioxins/Furans Ethylene Dibromide TOC pH
Ground Water	VOA BNA Extractables Pesticides/PCBs Chlorinated Herbicides Organophosphorus Pesticides Oil and Grease Metals Mercury Gross Alpha and Beta U226 and U228 Asbestos COD Chloride Fluoride Cyanide Nitrate Hardness Alkalinity TDS TOC Acidity Specific Conductance Temperature pH Salinity Dissolved Oxygen General Minerals

Notes:
1. VOA indicates volatile organic analysis.
2. BNA indicates base, neutral, and acid.
3. COD indicates chemical oxygen demand.
4. TDS indicates total dissolved solids.
5. TOC indicates total organic carbon.

TABLE 3.25.2

SAMPLE TYPES AND ANALYSES FOR BACKGROUND SAMPLING ALONG AVENUE F

Sample Matrix	Analysis
Soils	
Split Spoon Samples	VOA BNA Extractables Pesticides/PCBs Petroleum Hydrocarbons Metals Mercury Total Cyanides Ethylene Dibromide pH TOC
Ground Water	
	VOA BNA Extractables Metals Mercury General Minerals Ethylene Dibromide Pesticides/PCBs Herbicides Organophosphorus Pesticides Oil and Grease Total Cyanide Hardness Alkalinity TDS TOC pH Dissolved oxygen Acidity Specific Conductance

Notes:

1. VOA indicates volatile organic analysis.
2. BNA indicates base, neutral, and acid.
3. TDS indicates total dissolved solids.
4. TOC indicates total organic carbon.

TABLE 3.25.3

SAMPLE TYPES AND ANALYSES FOR BACKGROUND SAMPLING ALONG EASTERN BOUNDARY OF NAS ALAMEDA

Sample Matrix	Analysis
Soils	
Split Spoon Samples	VOA BNA Extractables Pesticides/PCBs Petroleum Hydrocarbons Metals Mercury Total Cyanides Ethylene Dibromide pH TOC
Ground Water	
	VOA BNA Extractables Metals General Minerals Ethylene Dibromide Pesticides/PCBs Herbicides Organophosphorus Pesticides Oil and Grease Petroleum Hydrocarbons Mercury Total Cyanide Hardness Alkalinity TDS TOC pH Dissolved oxygen Acidity Specific Conductance

Notes:

1. VOA indicates volatile organic analysis.
2. BNA indicates base, neutral, and acid.
3. TDS indicates total dissolved solids.
4. TOC indicates total organic carbon.
5. PCBs indicates polychlorinated biphenyls.

TABLE 3.25.4

SAMPLE TYPES AND ANALYSES FOR BACKGROUND SAMPLING
UPGRADIENT OF OIL REFINERY SITE

Sample Matrix	Analysis
Soils	
Split Spoon Samples	VOA BNA Extractables Pesticides/PCBs Petroleum Hyrdocarbons Metals Total Cyanides Ethylene Dibromide pH TOC
Ground Water	VOA BNA Extractables Metals General Minerals Ethylene Dibromide Pesticides/PCBs Herbicides Organophosphorus Pesticides Oil and Grease COD BOD Salinity Total Cyanide Hardness Alkalinity TDS TOC pH Dissolved oxygen Acidity Specific Conductance

Notes:

1. VOA indicates volatile organic analysis.
2. BNA indicates base, neutral, and acid.
3. TDS indicates total dissolved solids.
4. TOC indicates total organic carbon.
5. BOD indicates biological oxygen demand.
6. COD indicates chemical oxygen demand.
7. PCBs indicates polychlorinated biphenyls.

TABLE 3.25.5

NUMBER AND TYPE OF BACKGROUND SAMPLES
TO BE COLLECTED AT NAS ALAMEDA

Site	Total Depth (ft)	Total Soil Samples	Surface Soil Samples	Split Spoon Samples	Thin Walled Samples	Install Monitoring Well	Sample Ground Water
Landfill Areas	15	6	1	3	2	MWBG-1	Yes
Avenue F	15	6	1	3	2	MWBG-2	Yes
East Boundary	15	6	1	3	2	MWBG-3	Yes
Oil Refinery	15	6	1	3	2	MWBG-4	Yes

TABLE 3.26.1

SAMPLE TYPES AND ANALYSES FOR OFFSHORE SAMPLING

Sample Matrix	Analysis
Sediment	VOA BNA Extractables Pesticides/PCBs Metals Gross Alpha and Beta U226 and UU228 Asbestos Mercury Oil and Grease TOC pH Bioassays
Surface Water	VOA BNA Extractables Pesticides/PCBs Oil and Grease Metals Mercury General Minerals Hardness Total organic carbon (TOC) Dissolved oxygen pH Salinity

TABLE 3.26.2

NUMBER AND TYPE OF OFFSHORE SAMPLES TO BE COLLECTED AT NAS ALAMEDA

Sample Type	Number of Samples
Sediment	5
Surface Water	5

TABLE 3.26.3

TIDAL INFLUENCE STUDY SITES AT NAS ALAMEDA

Site Number	Site Name	Number of Monitoring Wells to be Employed at Each Site
6	Building 41	1
7	Building 162	1
9	Building 410	1
10	Building 400	2
11	Building 14	2
14	Fire Training Area	1
15	Building 301 and 389	1
16	Cans C-2 Area	2
19	Yard D-13	2

FIGURES

FINAL SAMPLING PLAN
REMEDIAL INVESTIGATION / FEASIBILITY STUDY

DATED 01 FEBRUARY 1990

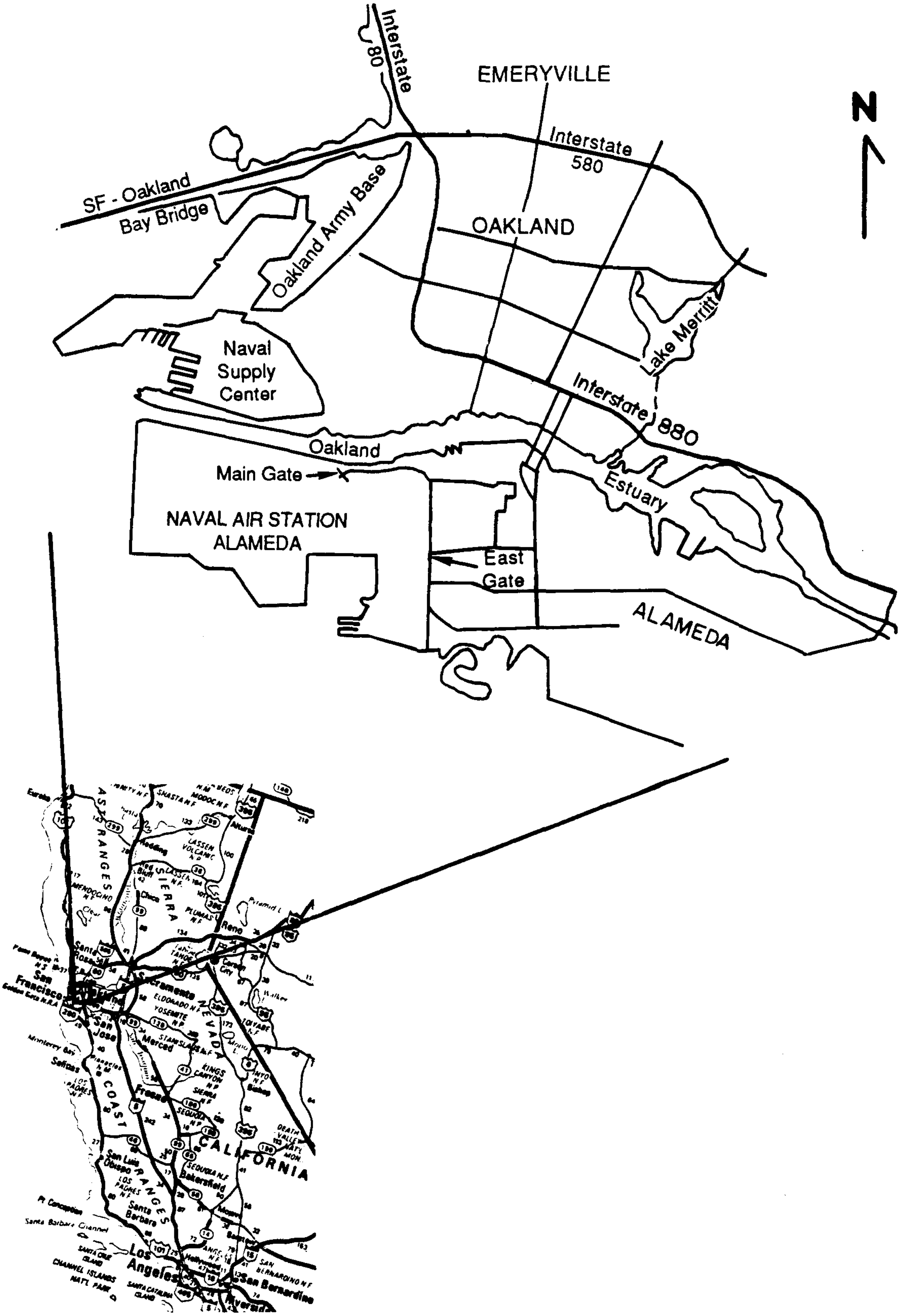
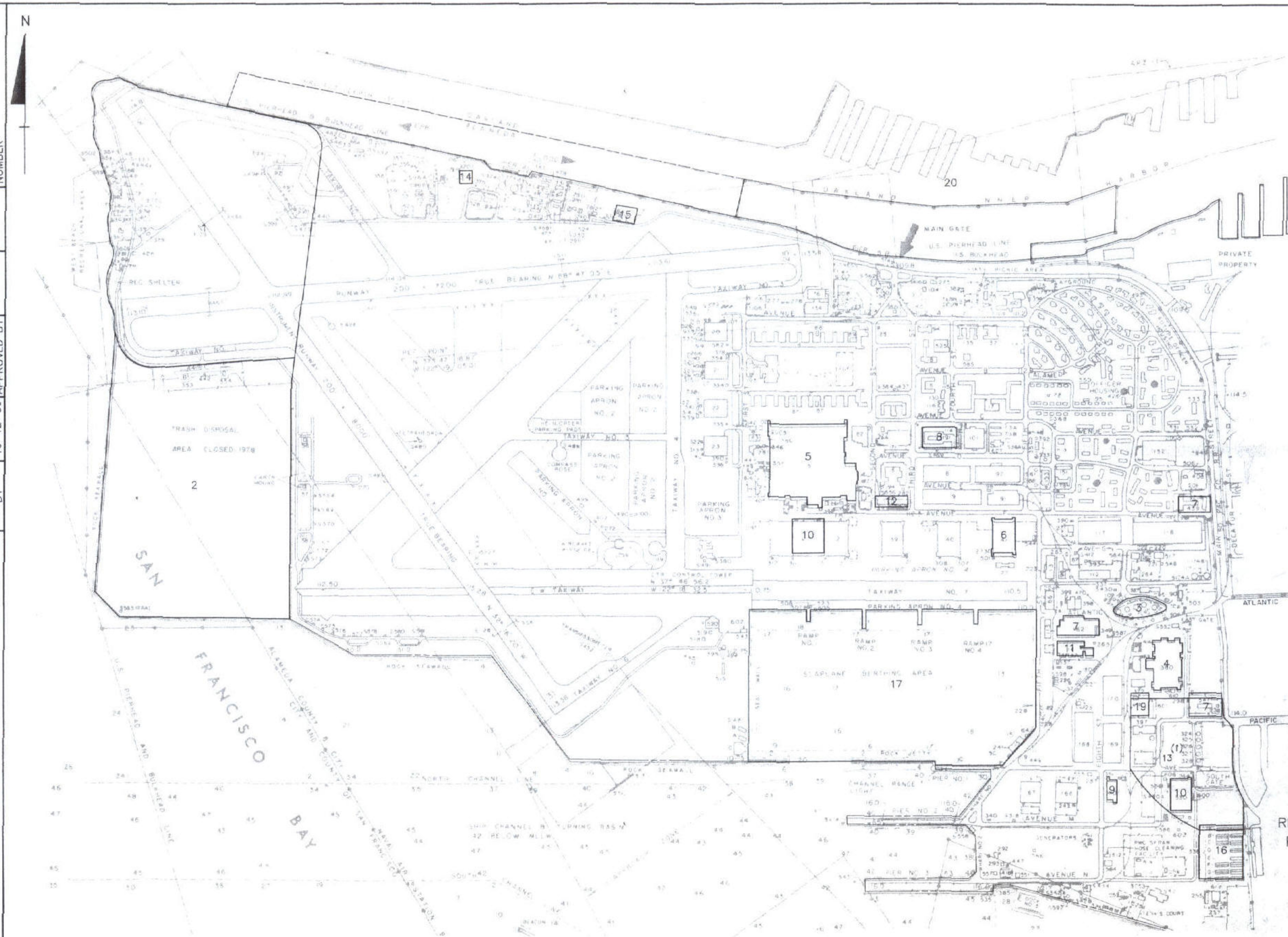


Figure 1.1. General location map.

NOT TO SCALE

SOURCE:
- BEST AVAILABLE U.S. NAVY BLUEPRINT

CanonieEnvironmental



NOTES:

1. THE AREA OF SITE 13 INCLUDES THE AREAS OF SITES 10 AND 16.

LEGEND:

SITE NO.	SITE DESCRIPTION
1	1943–1956 DISPOSAL SITE
2	WEST BEACH LANDFILL
3	AREA 97 (AVIATION GASOLINE TANKS)
4	BUILDING 360 (PLATING SHOP, ENGINE CLEANING SHOP, PAINT SHOP, AND PAINT STRIPPING SHOP)
5	BUILDING 5 (PLATING SHOP, PAINT STRIPPING SHOP, CLEANING SHOP, AND PAINT SHOP)
6	BUILDING 41 (AIRCRAFT INTERMEDIATE MAINTENANCE DEPT.)
7	BUILDING 162, 459, AND 547 (SERVICE STATIONS)
8	BUILDING 114 (PEST CONTROL AREA AND SEPARATOR PIT)
9	BUILDING 410 (PAINT STRIPPING)
10	BUILDINGS 400 AND 530 (MISSILE REWORK OPERATIONS)
11	BUILDING 14 (ENGINE TEST CELL)
12	BUILDING 10 (POWER PLANT)
13	OIL REFINERY
14	FIRE TRAINING AREA
15	BUILDINGS 301 AND 389 (STORAGE AREA)
16	CANS C-2 AREA
17	SEAPLANE LAGOON
18	STATION SEWER SYSTEM (NOT ON SITE)
19	YARD D-13 (HAZARDOUS WASTE SOLVENTS)
20	ESTUARY (OAKLAND INNER HARBOR)

REMEDIAL INVESTIGATION / FEASIBILITY STUDY SITES
NAVAL AIR STATION
ALAMEDA, CALIFORNIA

PREPARED FOR

WESTERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
SAN BRUNO, CALIFORNIA

Canonie Environmental

DATE:	10-12-89	FIGURE 1.2	DRAWING NUMBER 86-018-E61	REV. △
SCALE:	AS SHOWN			

No.	DATE	ISSUE / REVISION	DWN. BY	CK'D BY	AP'D BY
△	12-14-89	ISSUED FOR REPORT	KCH	TGB	

DRAWING NUMBER 86-018-E61
DRAWN BY VZC 10-12-89
CHECKED BY TGB APPROVED BY
CAD 86-018-E60 VZC 10-6-89

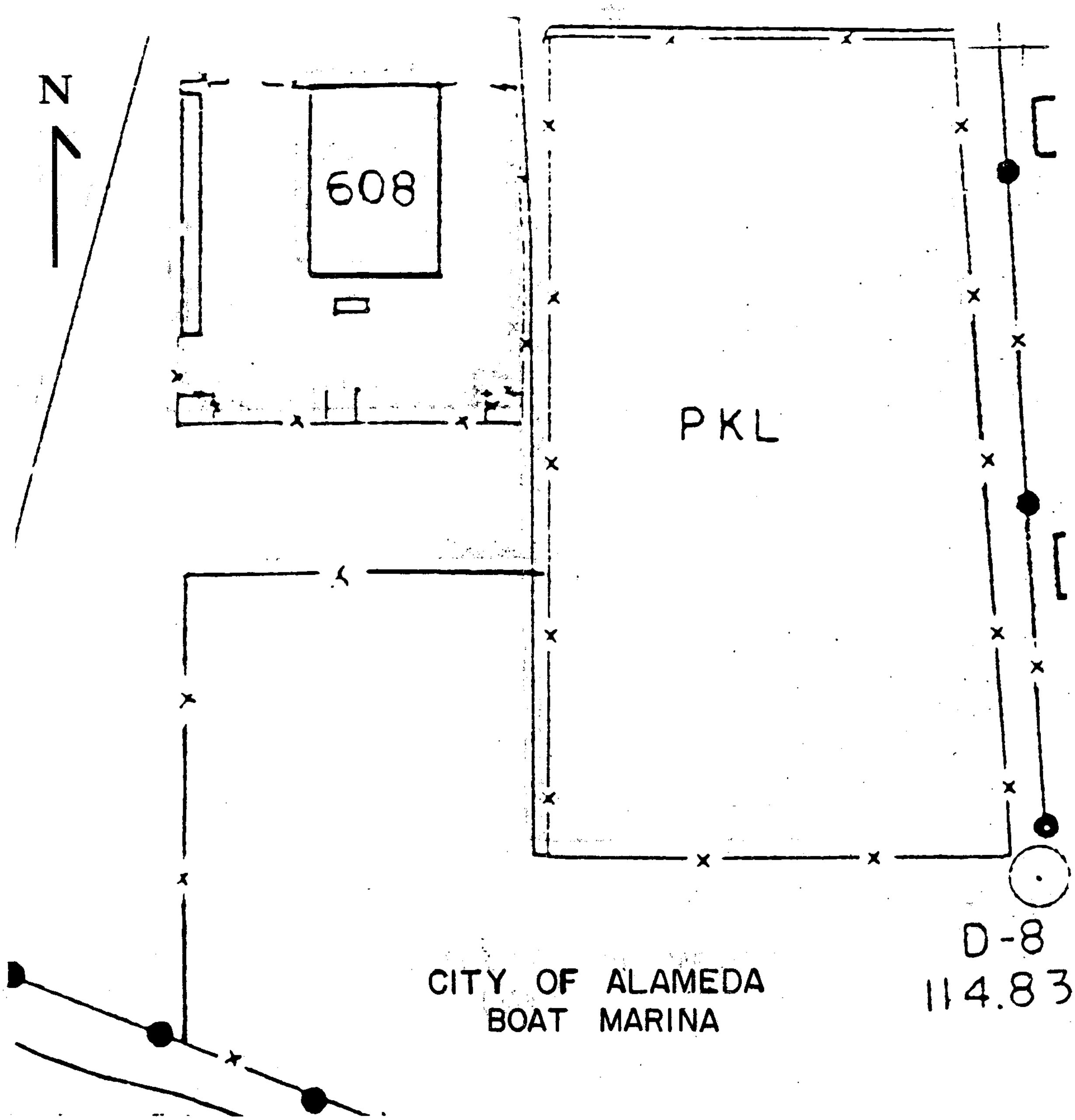


Figure 2.1. Proposed area for mobile field command center and decontamination center.

SOURCE:
- BEST AVAILABLE U.S. NAVY BLUEPRINT

NOT TO SCALE

Canonie Environmental

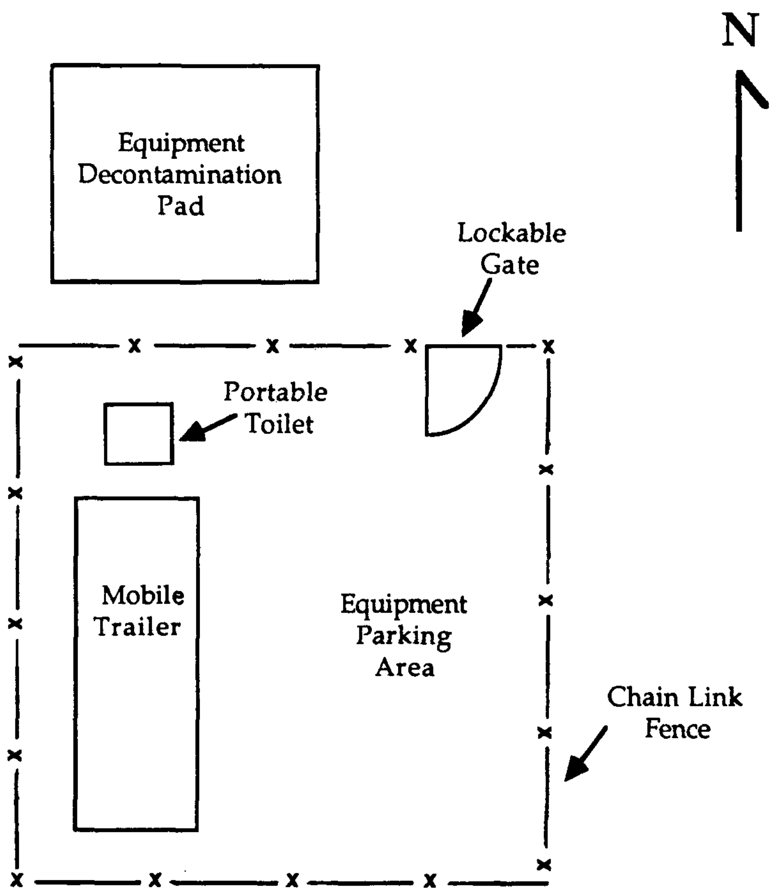


Figure 2.2. Field command center and decontamination pad.

SOURCE:
- BEST AVAILABLE U.S. NAVY BLUEPRINT

NOT TO SCALE

Canonie Environmental

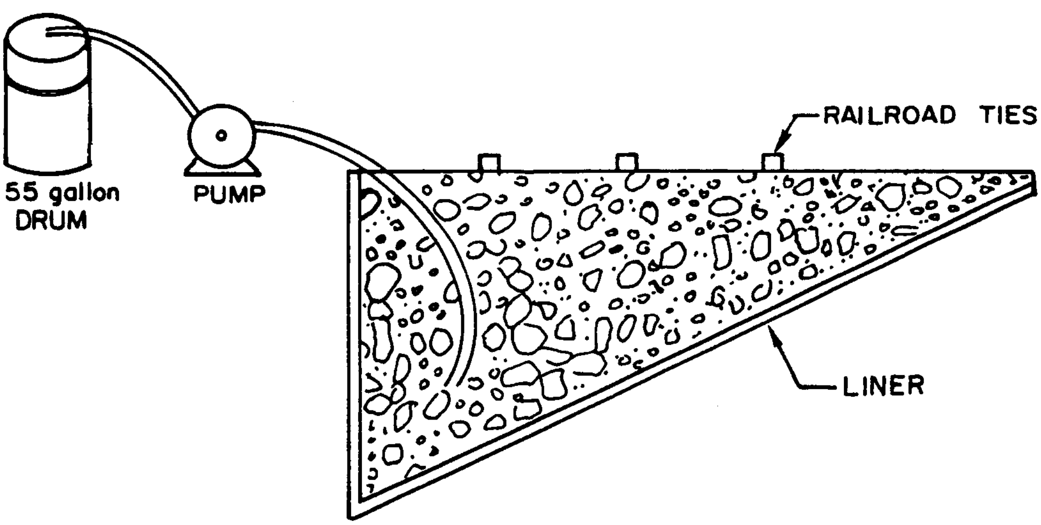


Figure 2.3. Decontamination pit.

SOURCE:
- BEST AVAILABLE U.S. NAVY BLUEPRINT

NOT TO SCALE

CanonieEnvironmental

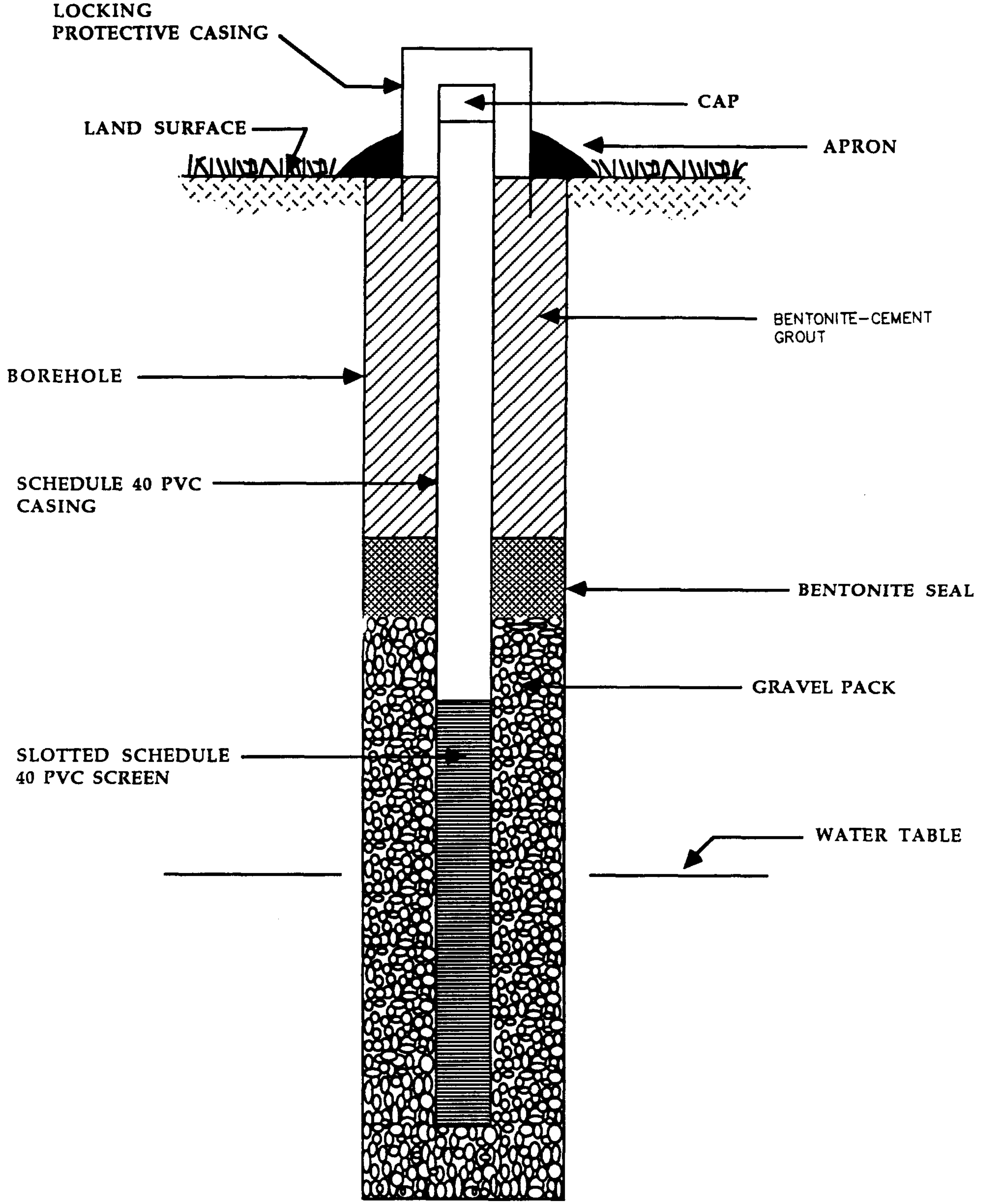


FIGURE 2.4 **Generalized monitoring well construction diagram.**

SOURCE:
- BEST AVAILABLE U.S. NAVY BLUEPRINT

NOT TO SCALE **Canonie**Environmental

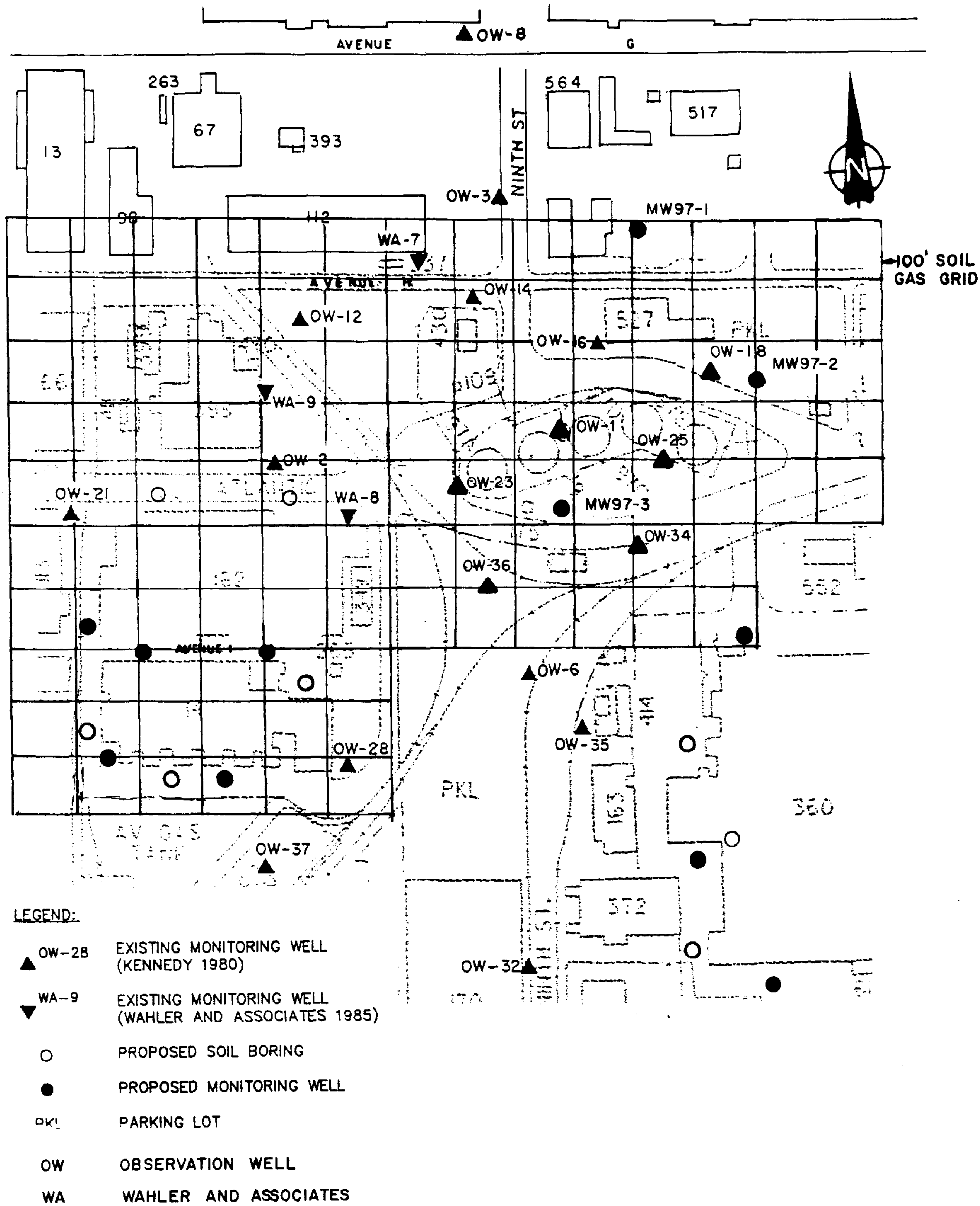
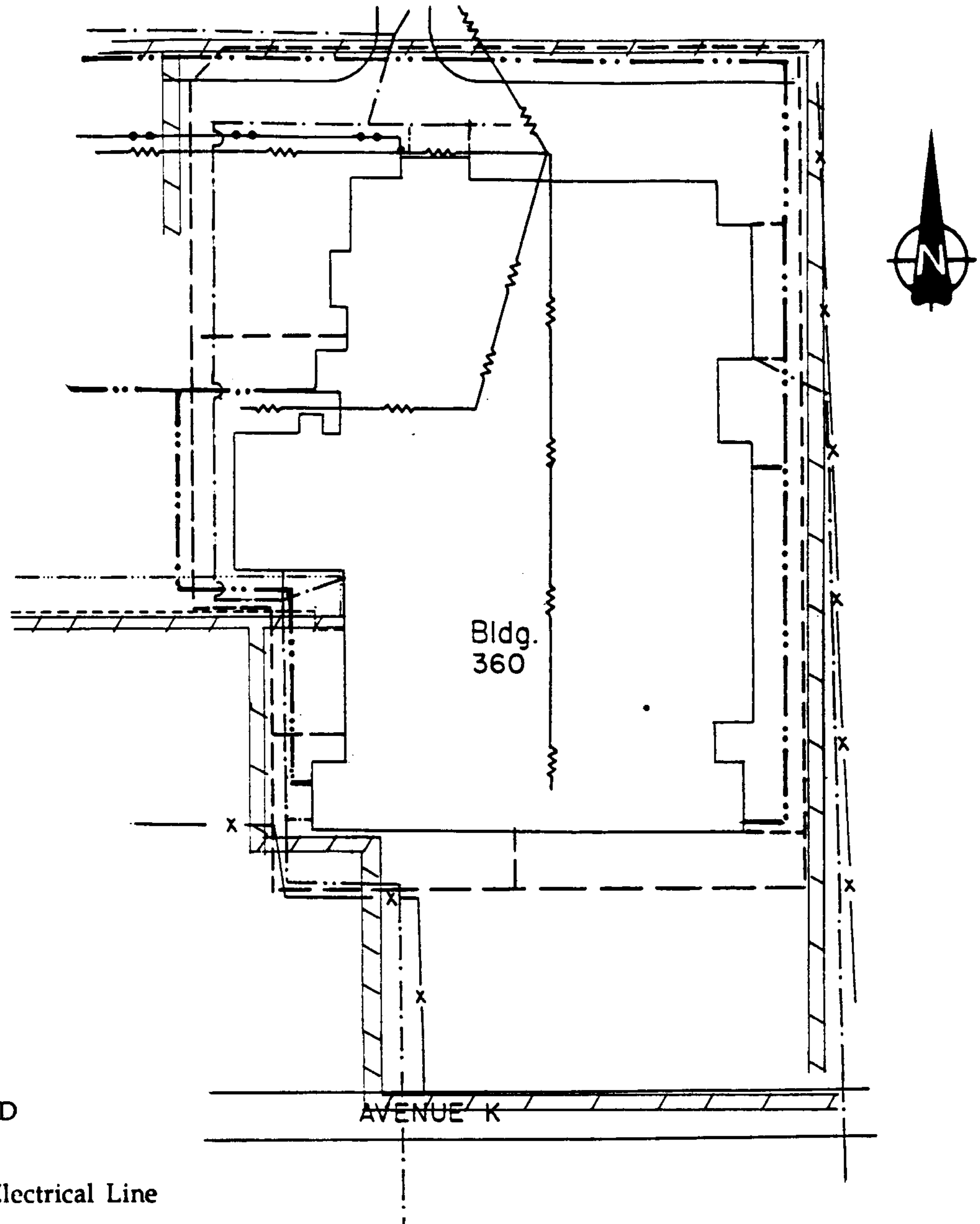


Figure 3.3.1. Area 97 sampling locations.

SOURCE:
- BEST AVAILABLE U.S. NAVY BLUEPRINT

NOT TO SCALE

CanonieEnvironmental



LEGEND

- Electrical Line
- Potable Water Line
- Fire Protection Sprinkler System
- Steam Line
- Natural Gas Line
- Compressed Air Line
- Storm Sewer
- Sanitary Sewer
- Industrial Waste Sewer

Figure 3.4.1. Building 360 buried utility schematic.

SOURCE:
- BEST AVAILABLE U.S. NAVY BLUEPRINT

NOT TO SCALE

Canonie Environmental

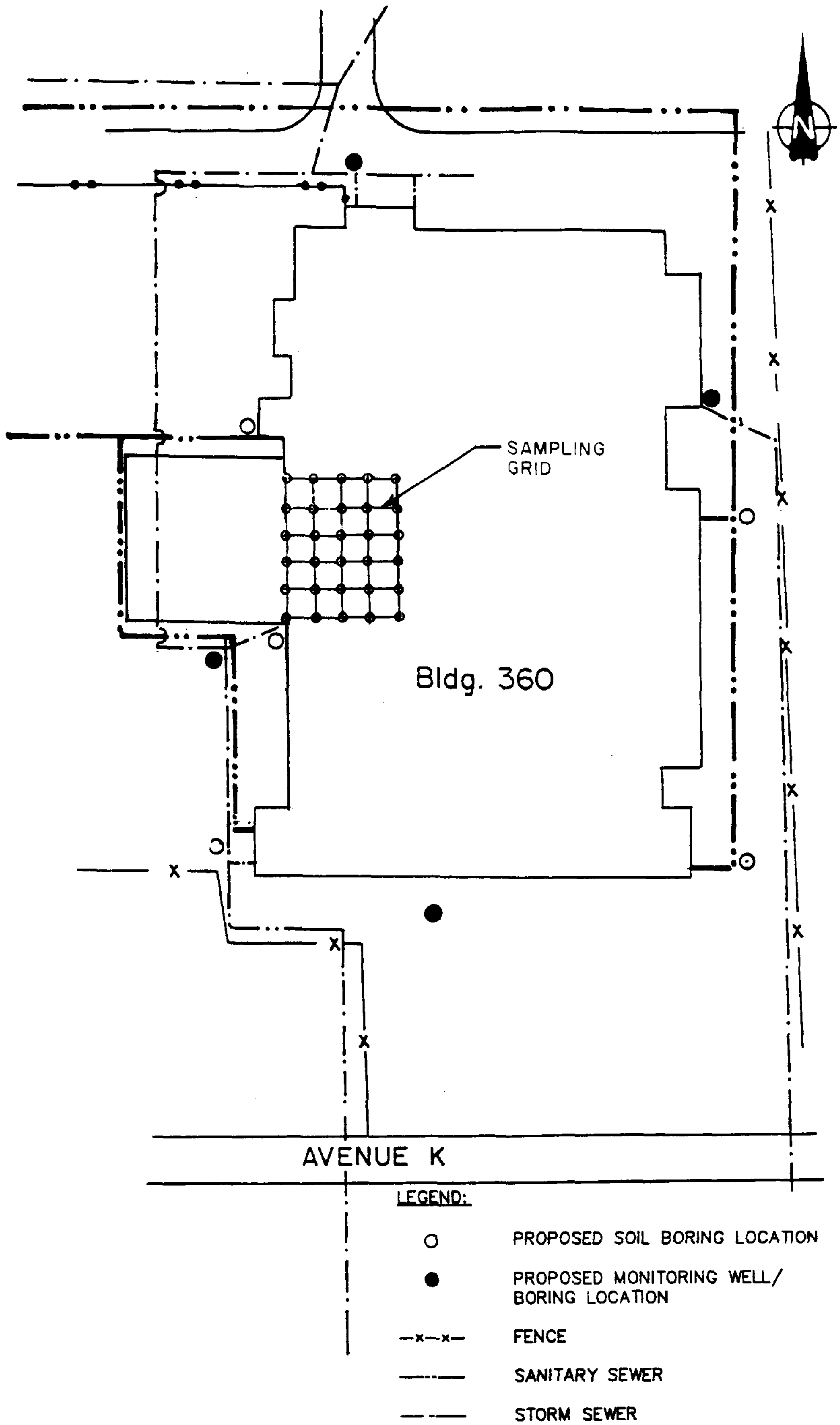


Figure 3.4.2. Building 360 sampling locations.

SOURCE:
- BEST AVAILABLE U.S. NAVY BLUEPRINT

NOT TO SCALE

Canonie Environmental

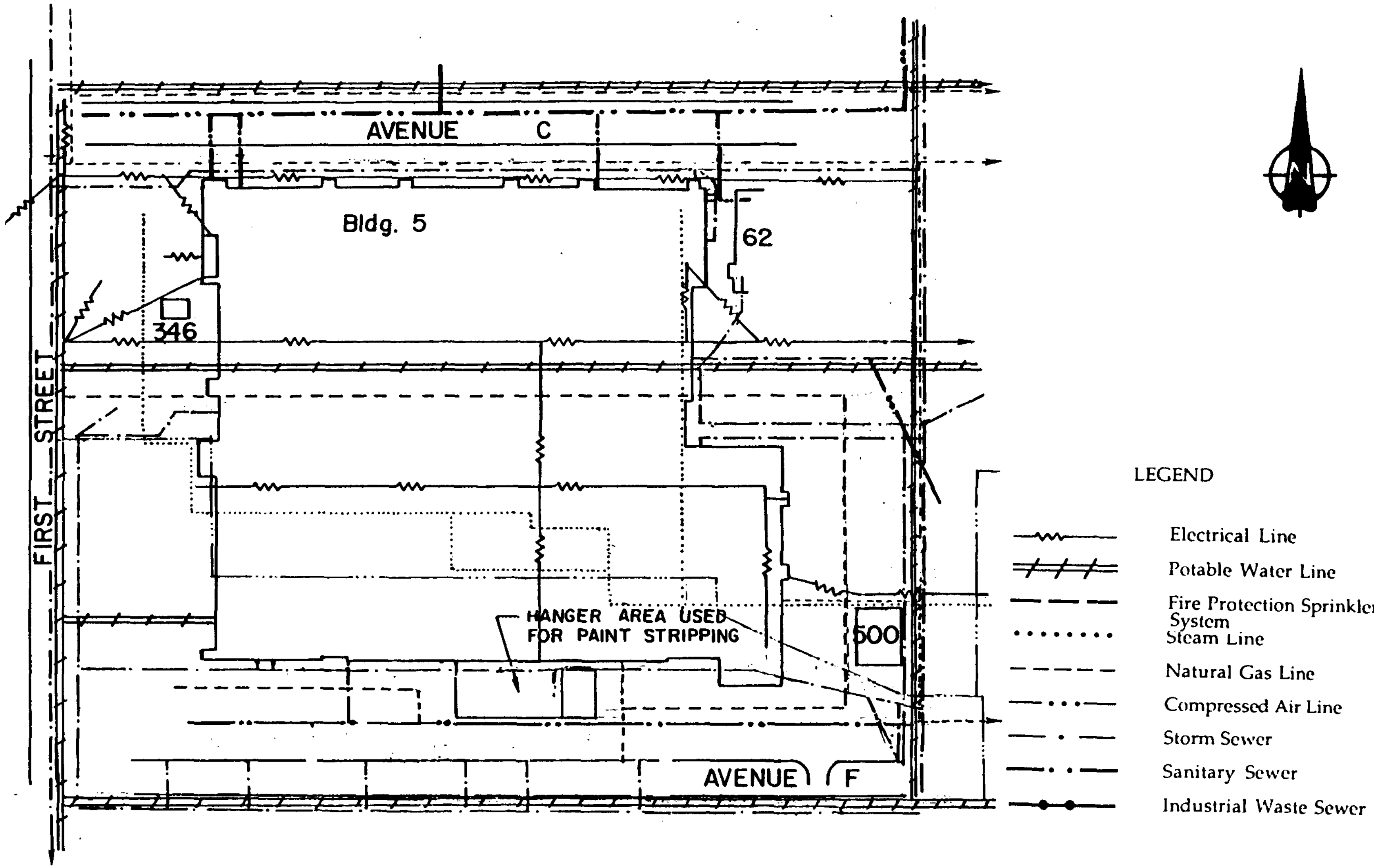


Figure 3.5.1. Building 5 buried utility schematic.

SOURCE:
- BEST AVAILABLE U.S. NAVY BLUEPRINT

NOT TO SCALE

Canonie Environmental

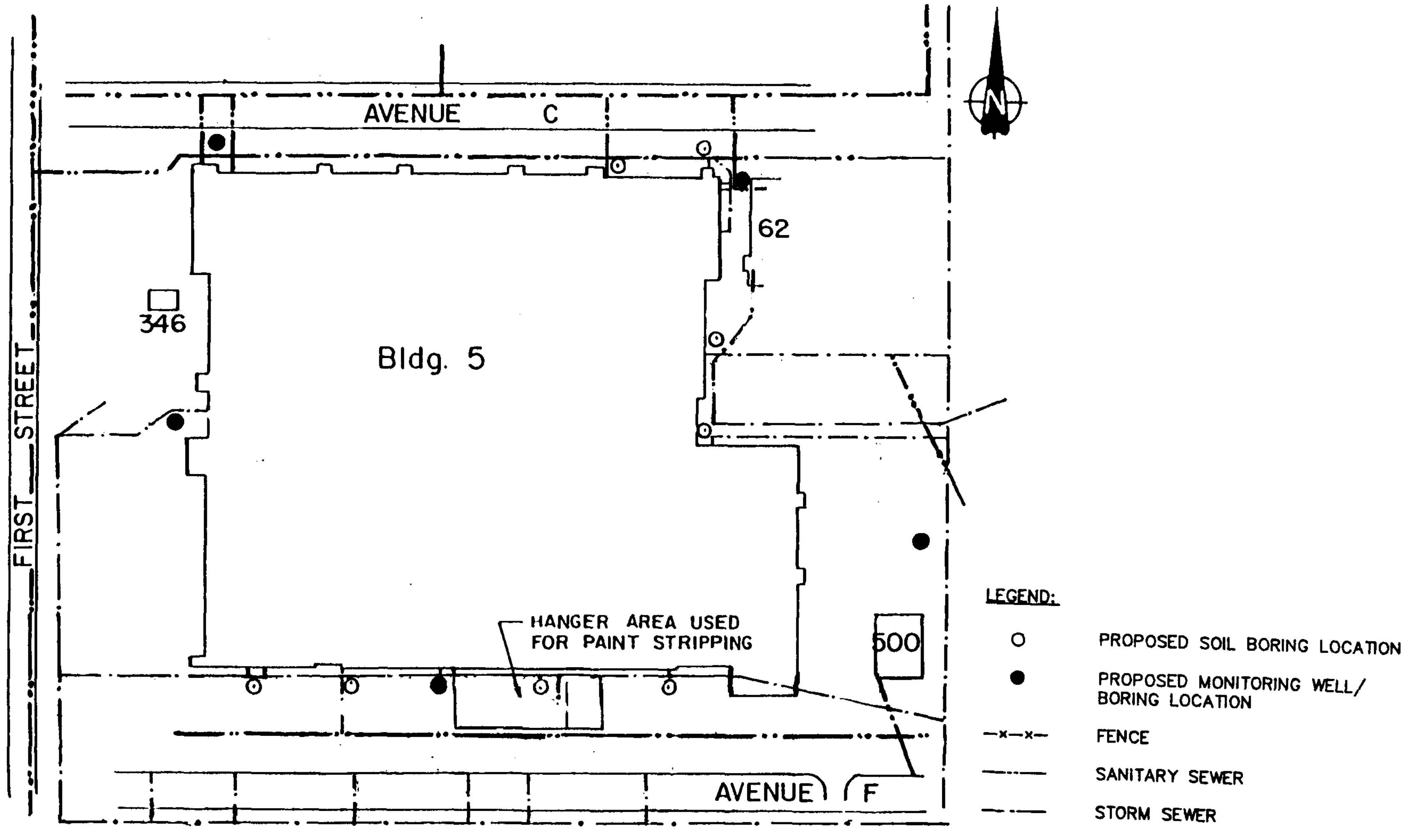


Figure 3.5.2. Building 5 sampling locations.

SOURCE:
- BEST AVAILABLE U.S. NAVY BLUEPRINT

NOT TO SCALE

Canonie Environmental

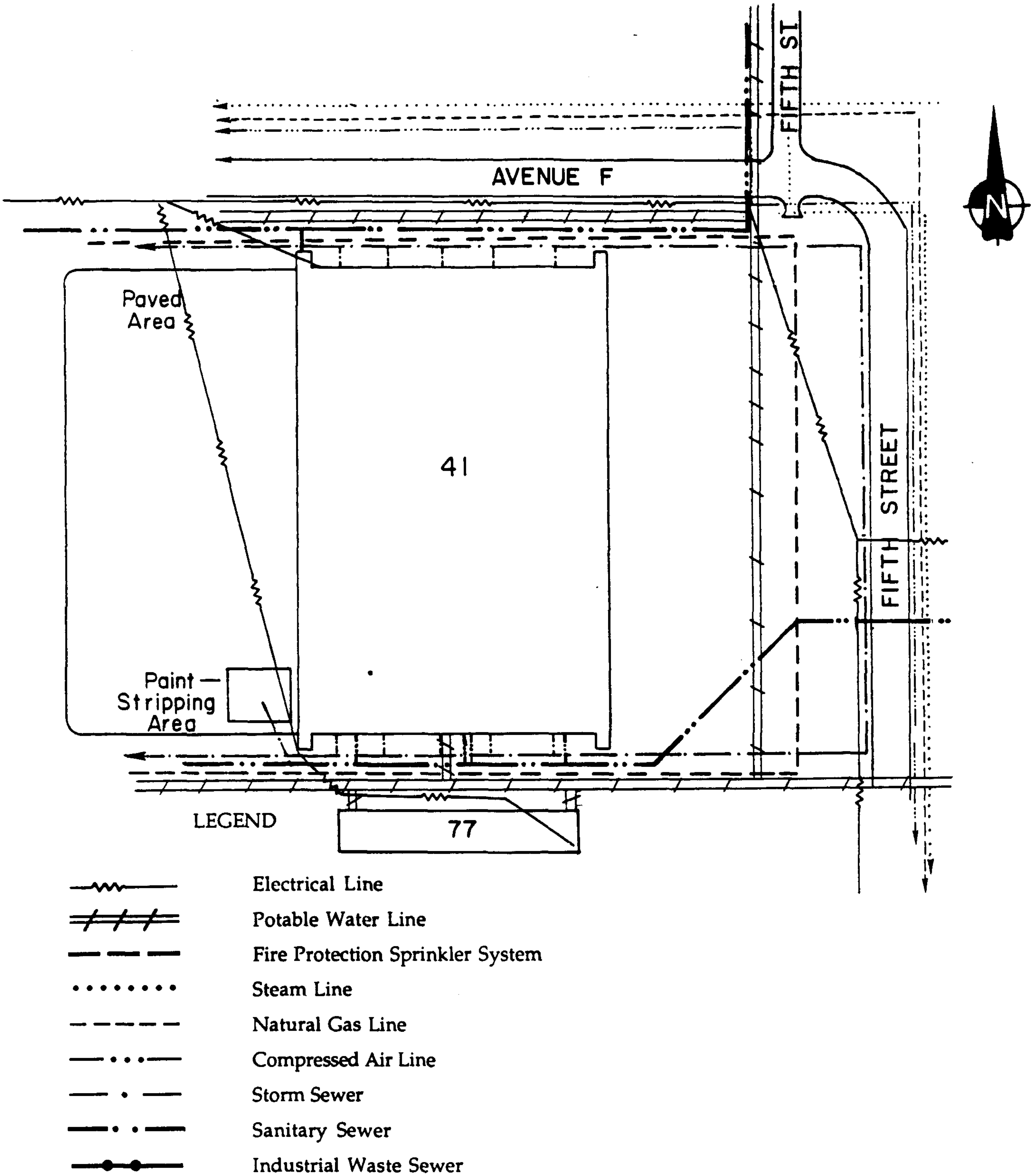


Figure 3.6.1. Building 41 buried utility schematic.

SOURCE:
- BEST AVAILABLE U.S. NAVY BLUEPRINT

NOT TO SCALE

Canonie Environmental

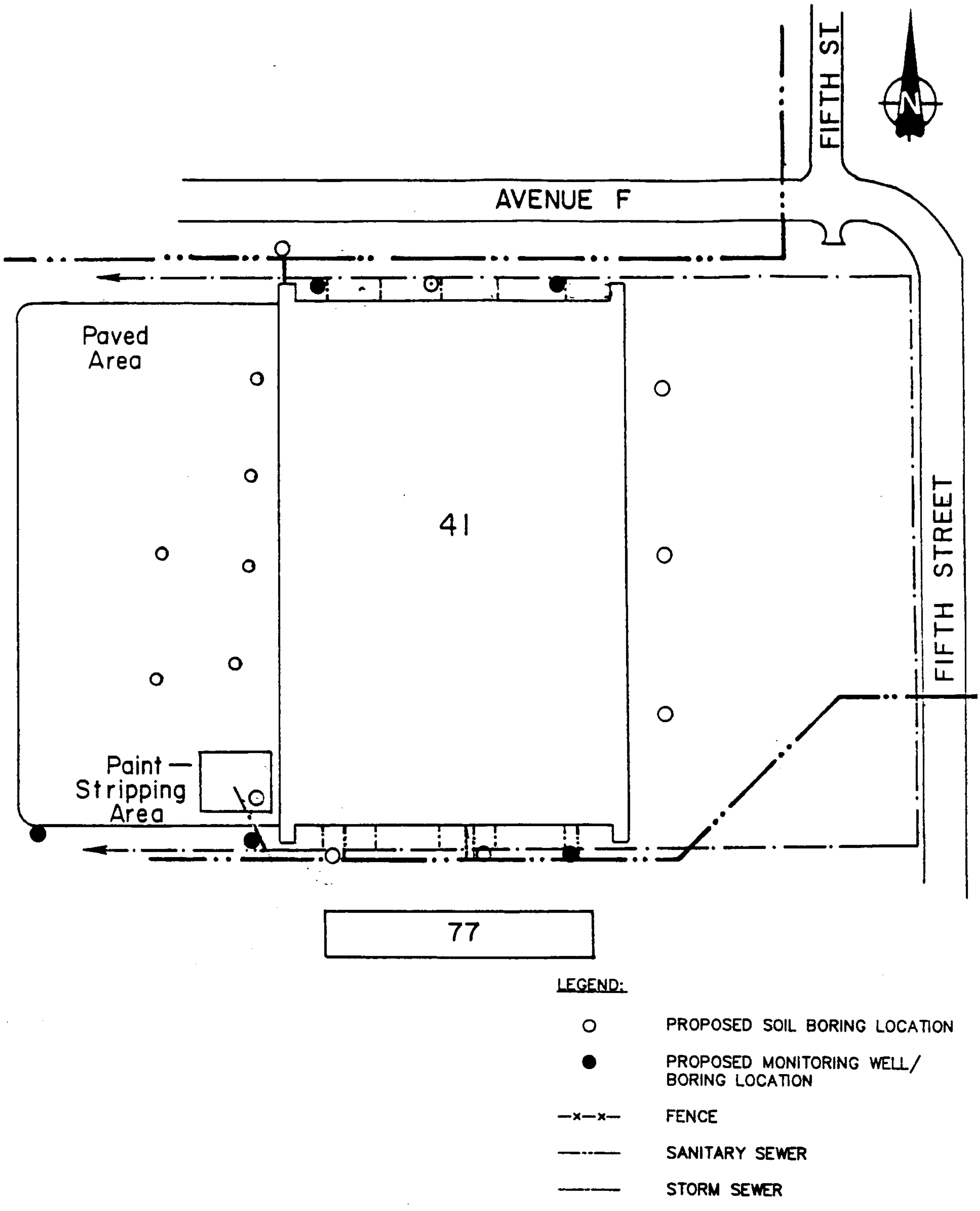
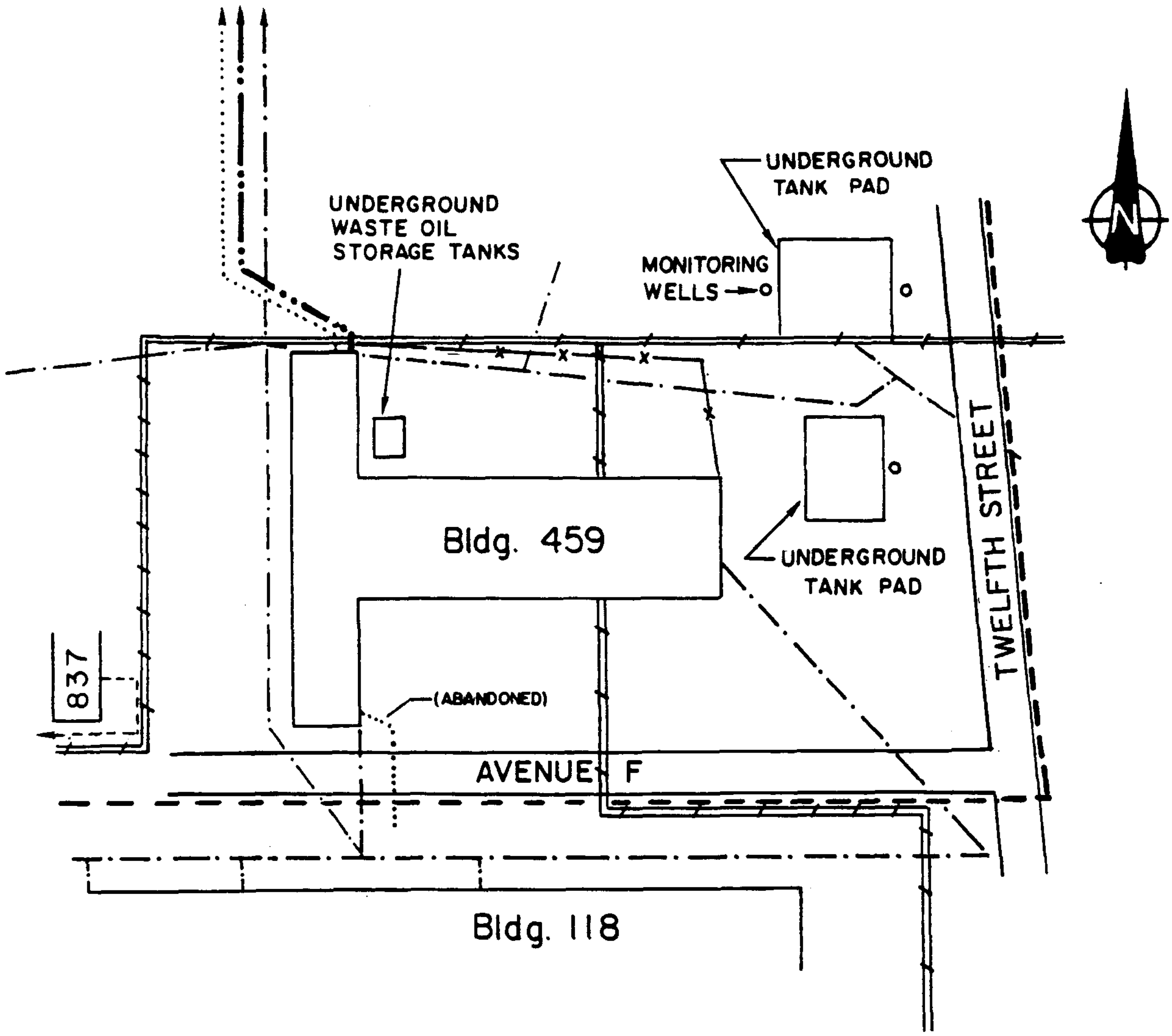


Figure 3.6.2. Building 41 sampling locations.

SOURCE:
- BEST AVAILABLE U.S.
NAVY BLUEPRINT

NOT TO SCALE

CanonieEnvironmental



LEGEND

—ʌʌʌ—	Electrical Line
≠≠≠	Potable Water Line
— — —	Fire Protection Sprinkler System
• • • • • • • •	Steam Line
- - - - -	Natural Gas Line
—•••—	Compressed Air Line
— • —	Storm Sewer
—• •—	Sanitary Sewer
—●—●—	Industrial Waste Sewer

Figure 3.7.1. Building 459 buried utility schematic.

SOURCE:
- BEST AVAILABLE U.S. NAVY BLUEPRINT

NOT TO SCALE

CanonieEnvironmental

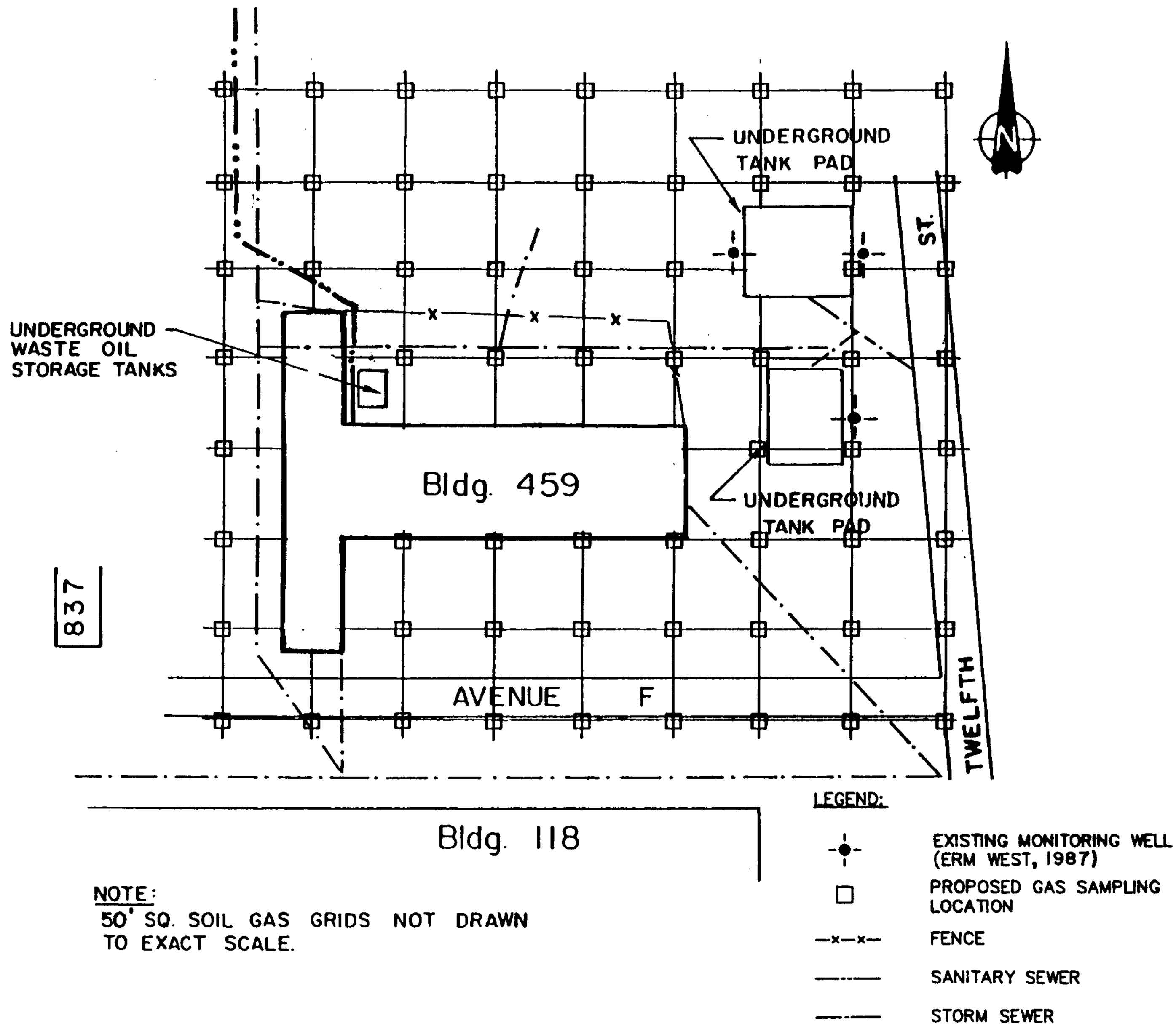


Figure 3.7.2. Building 459 soil gas survey locations.

SOURCE:

- BEST AVAILABLE U.S. NAVY BLUEPRINT

NOT TO SCALE

Canonie Environmental

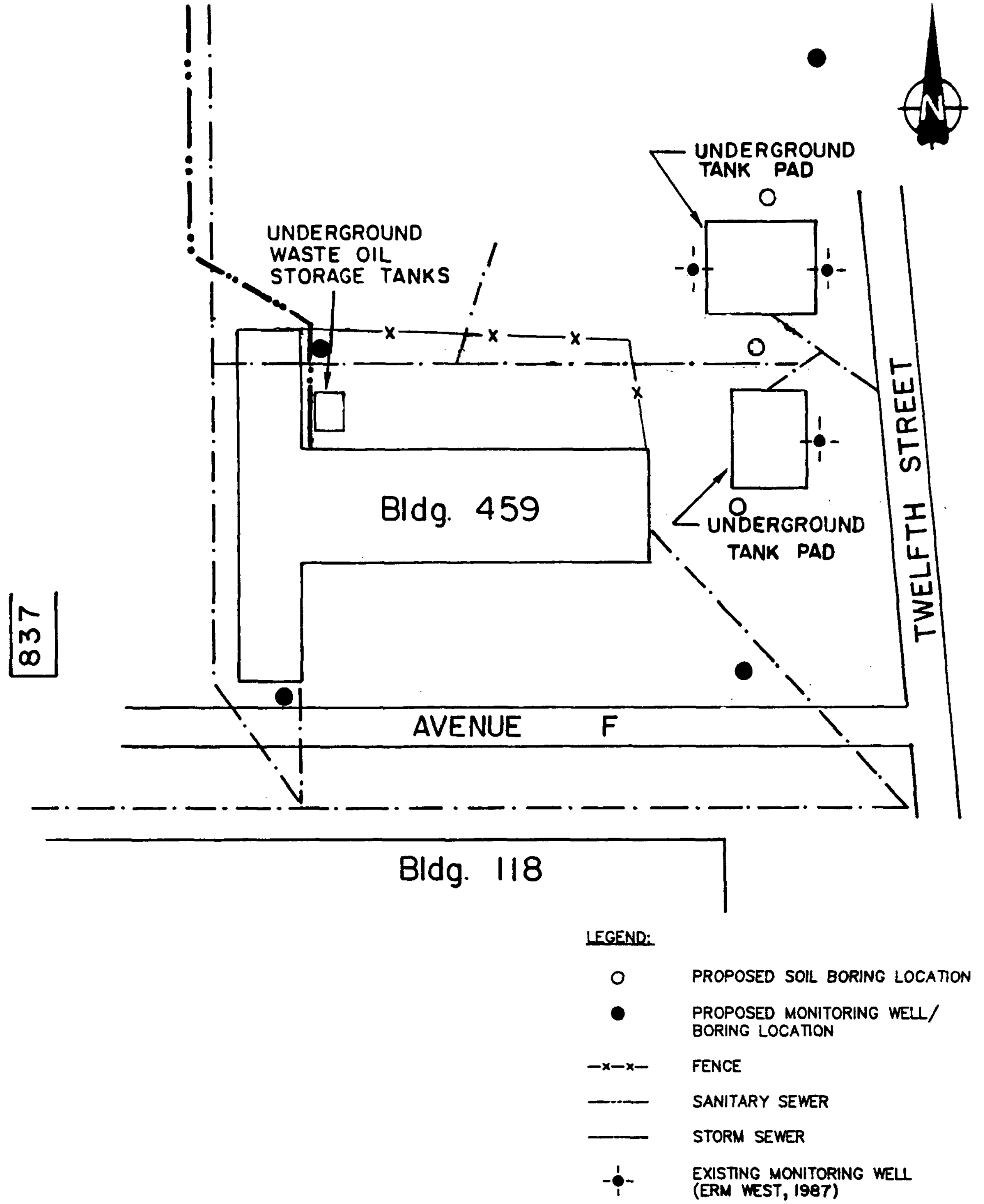


Figure 3.7.3. Building 459 sampling locations.

SOURCE:
- BEST AVAILABLE U.S. NAVY BLUEPRINT

NOT TO SCALE

CanonieEnvironmental

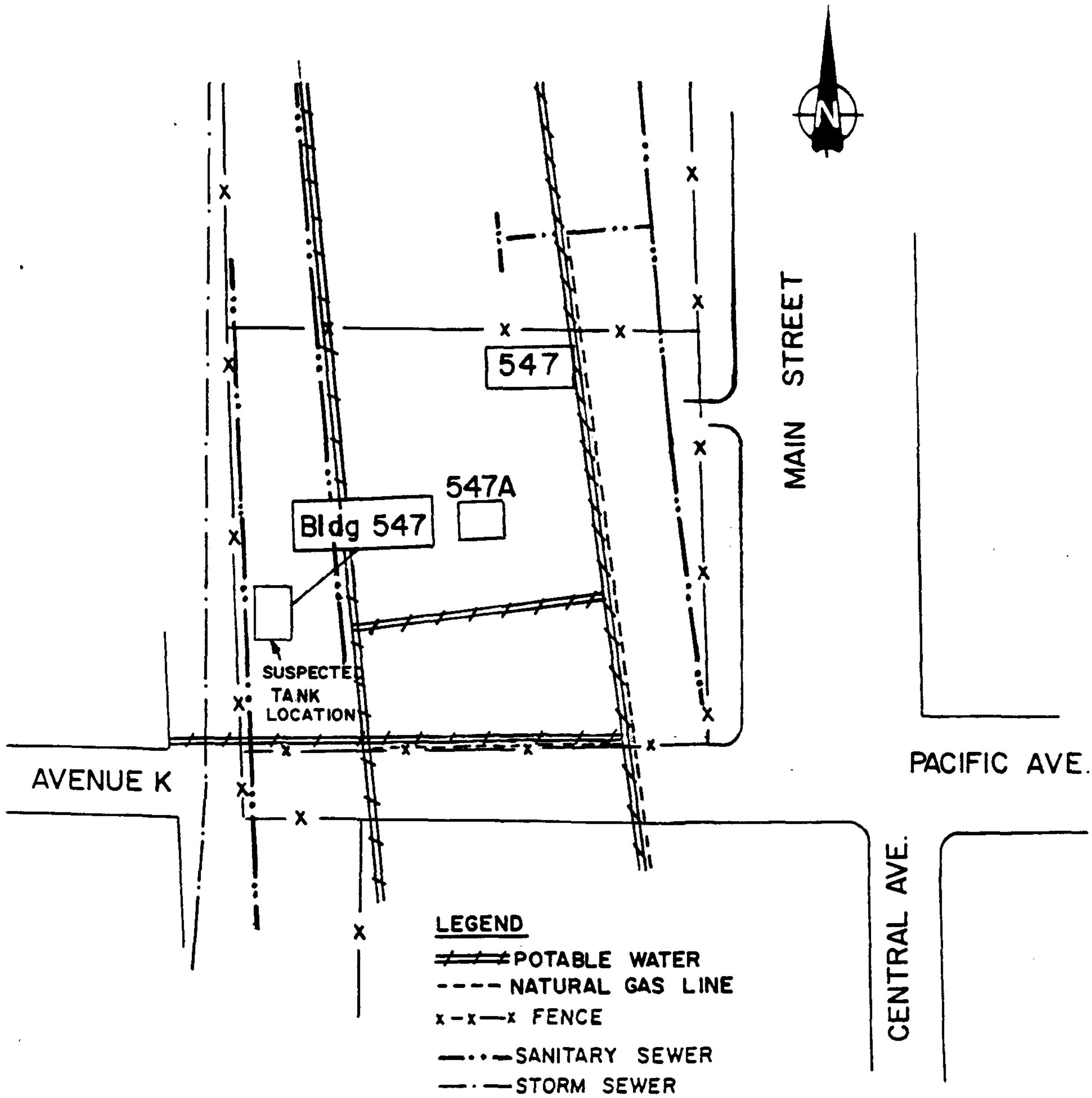


Figure 3.8.1. Building 547 buried utility schematic.

SOURCE:
- BEST AVAILABLE U.S. NAVY BLUEPRINT

NOT TO SCALE

Canonie Environmental

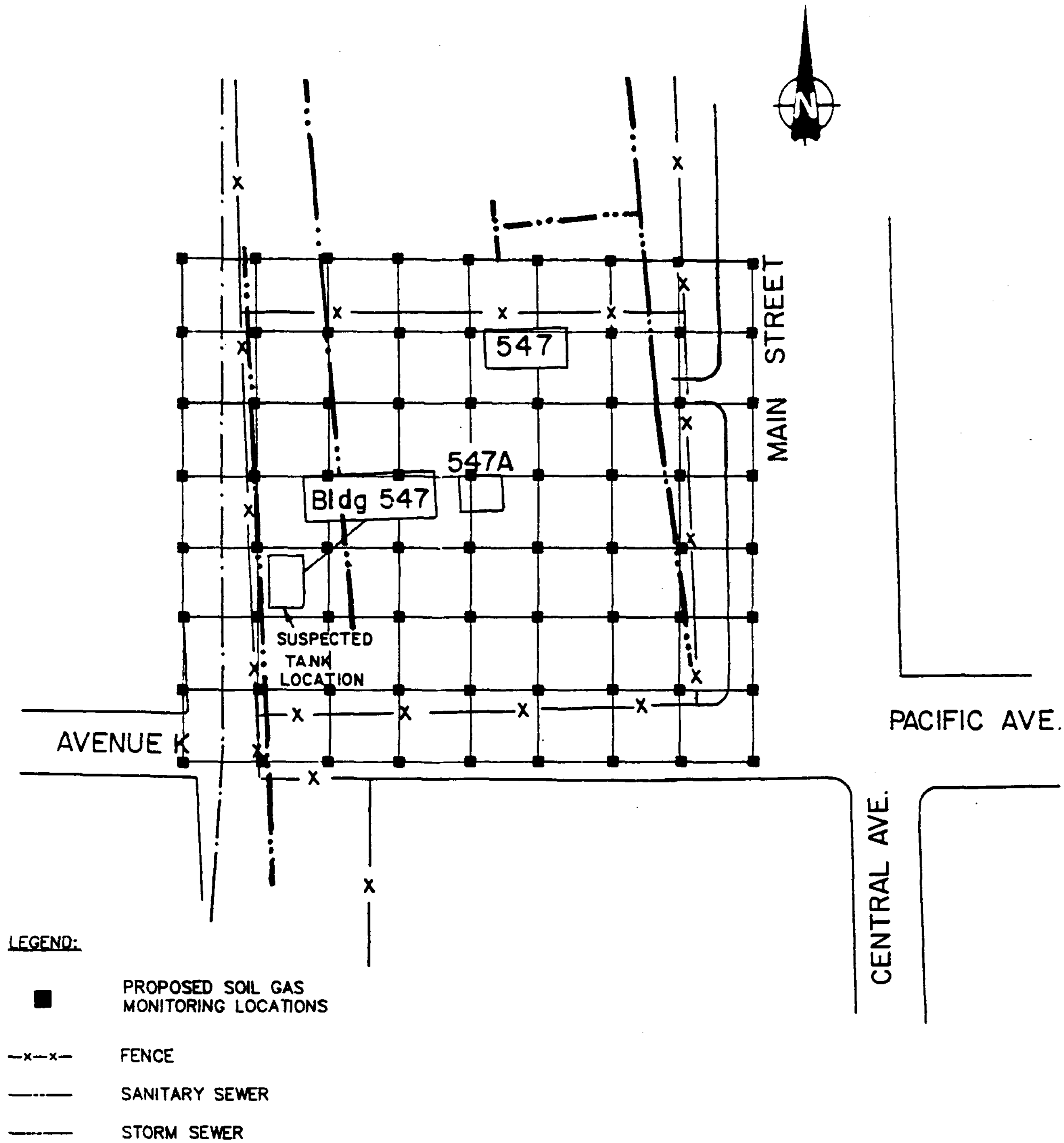


Figure 3.8.2. Building 547 soil gas survey locations.

SOURCE:
- BEST AVAILABLE U.S. NAVY BLUEPRINT

NOT TO SCALE

CanonieEnvironmental

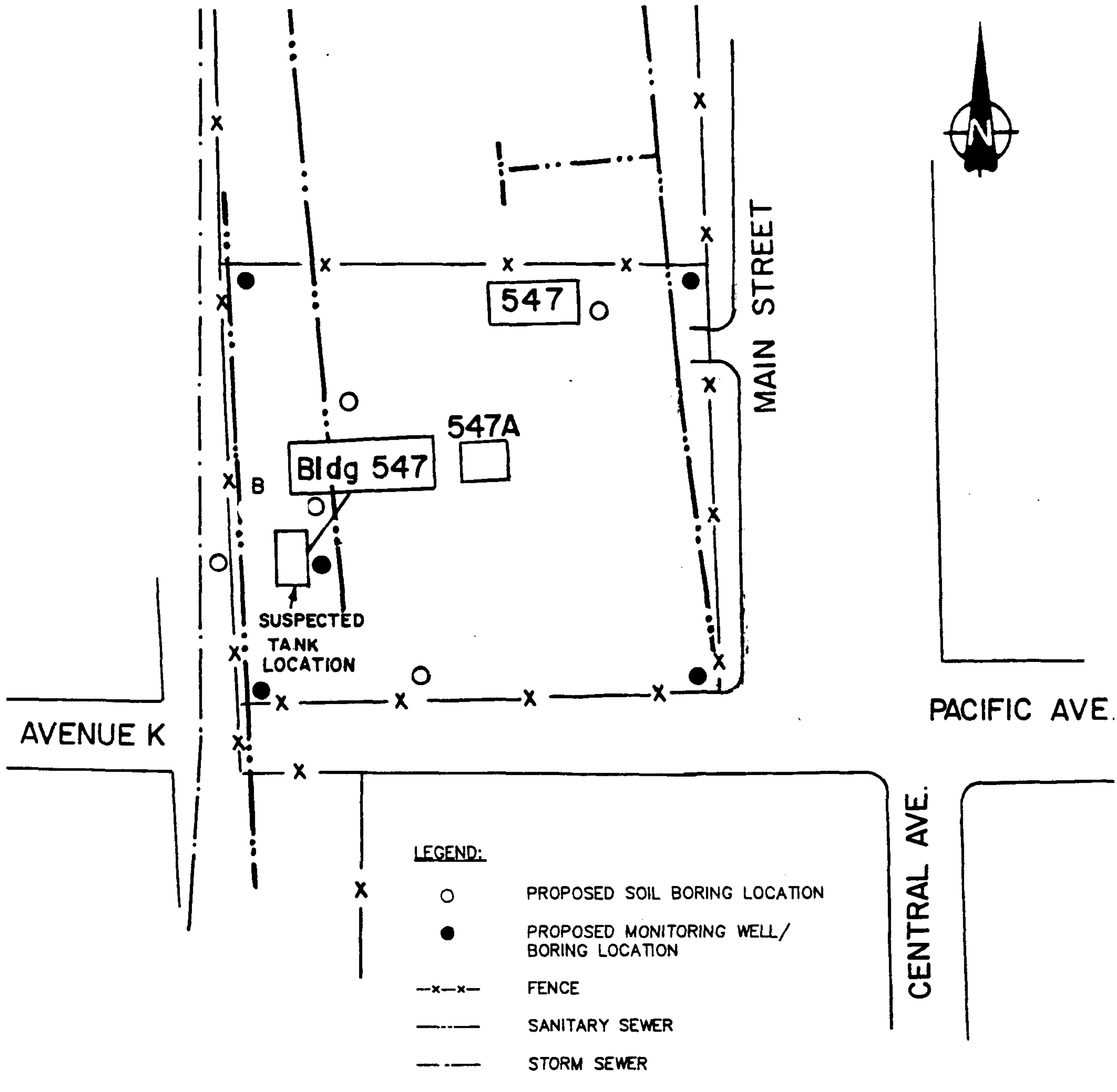


Figure 3.8.3. Building 547 sampling locations.

SOURCE:
- BEST AVAILABLE U.S. NAVY BLUEPRINT

NOT TO SCALE

CanonieEnvironmental

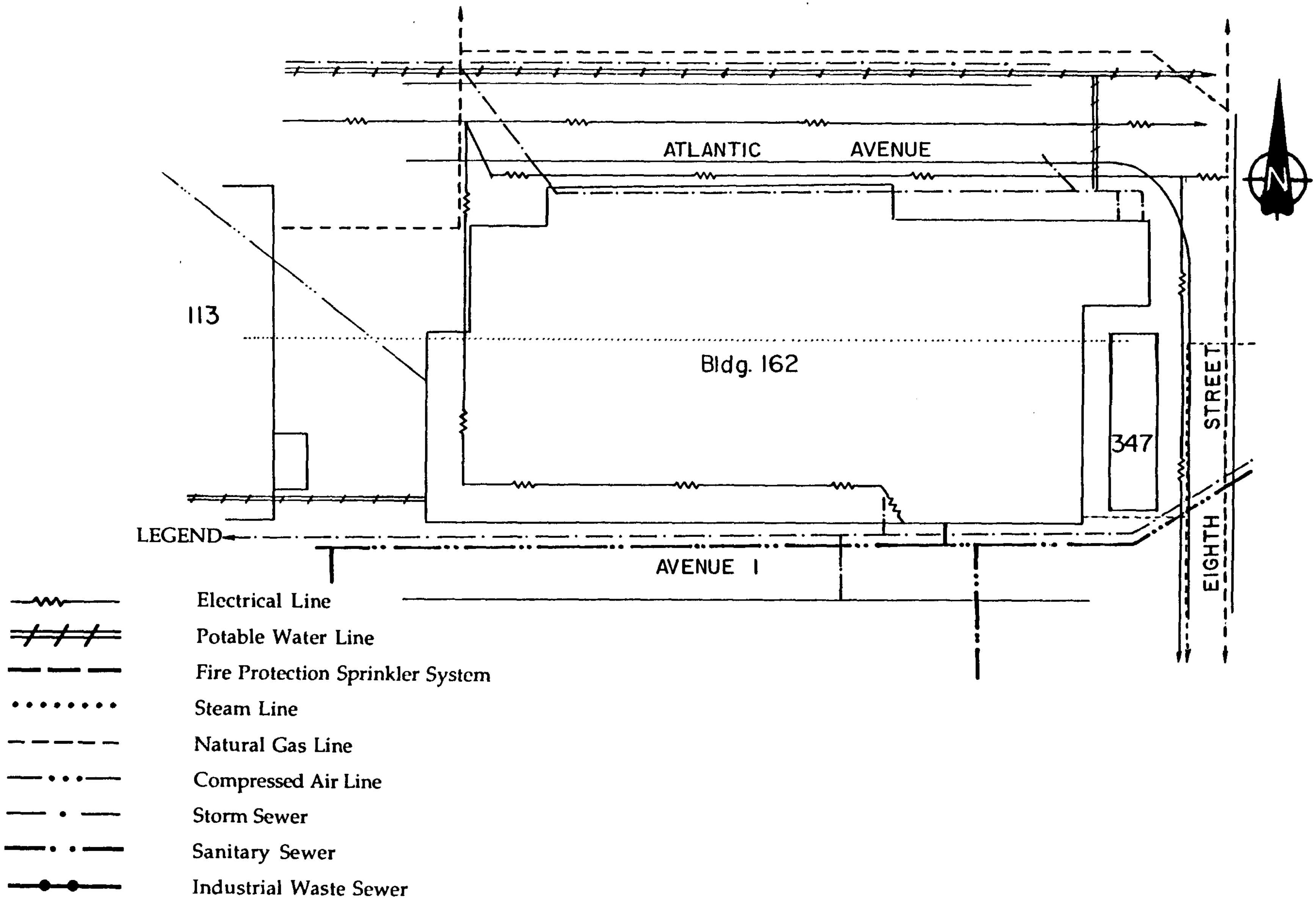
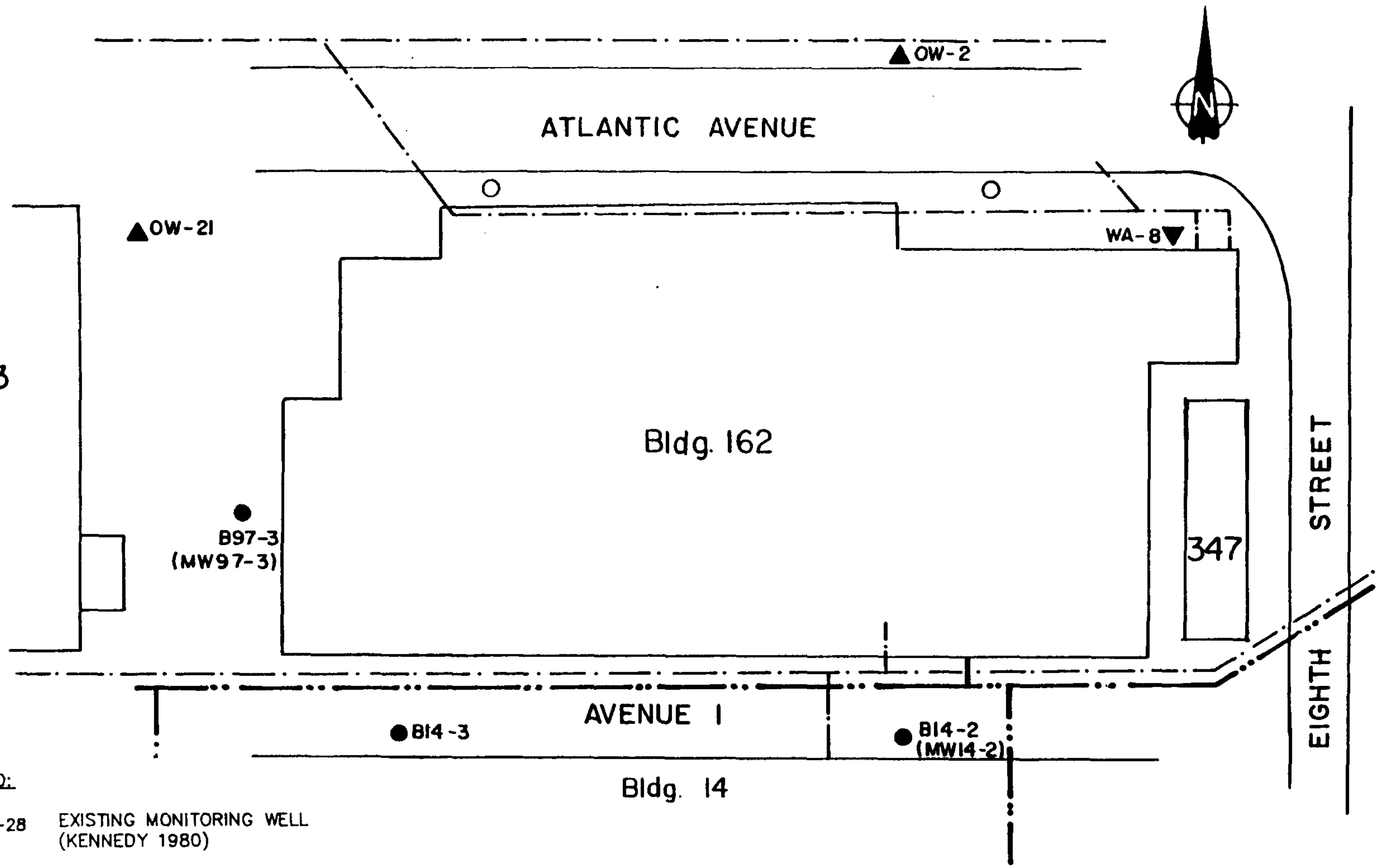


Figure 3.9.1. Building 162 buried utility schematic.

SOURCE:
- BEST AVAILABLE U.S. NAVY BLUEPRINT

NOT TO SCALE

Canonie Environmental



LEGEND:

▲ OW-28	EXISTING MONITORING WELL (KENNEDY 1980)
▼ WA-9	EXISTING MONITORING WELL (WAHLER AND ASSOCIATES 1985)
○	PROPOSED SOIL BORING
●	PROPOSED MONITORING WELL
OW	OBSERVATION WELL
WA	WAHLER AND ASSOCIATES

Figure 3.9.2. Building 162 sampling locations.

SOURCE:
- BEST AVAILABLE U.S. NAVY BLUEPRINT

NOT TO SCALE

Canonie Environmental

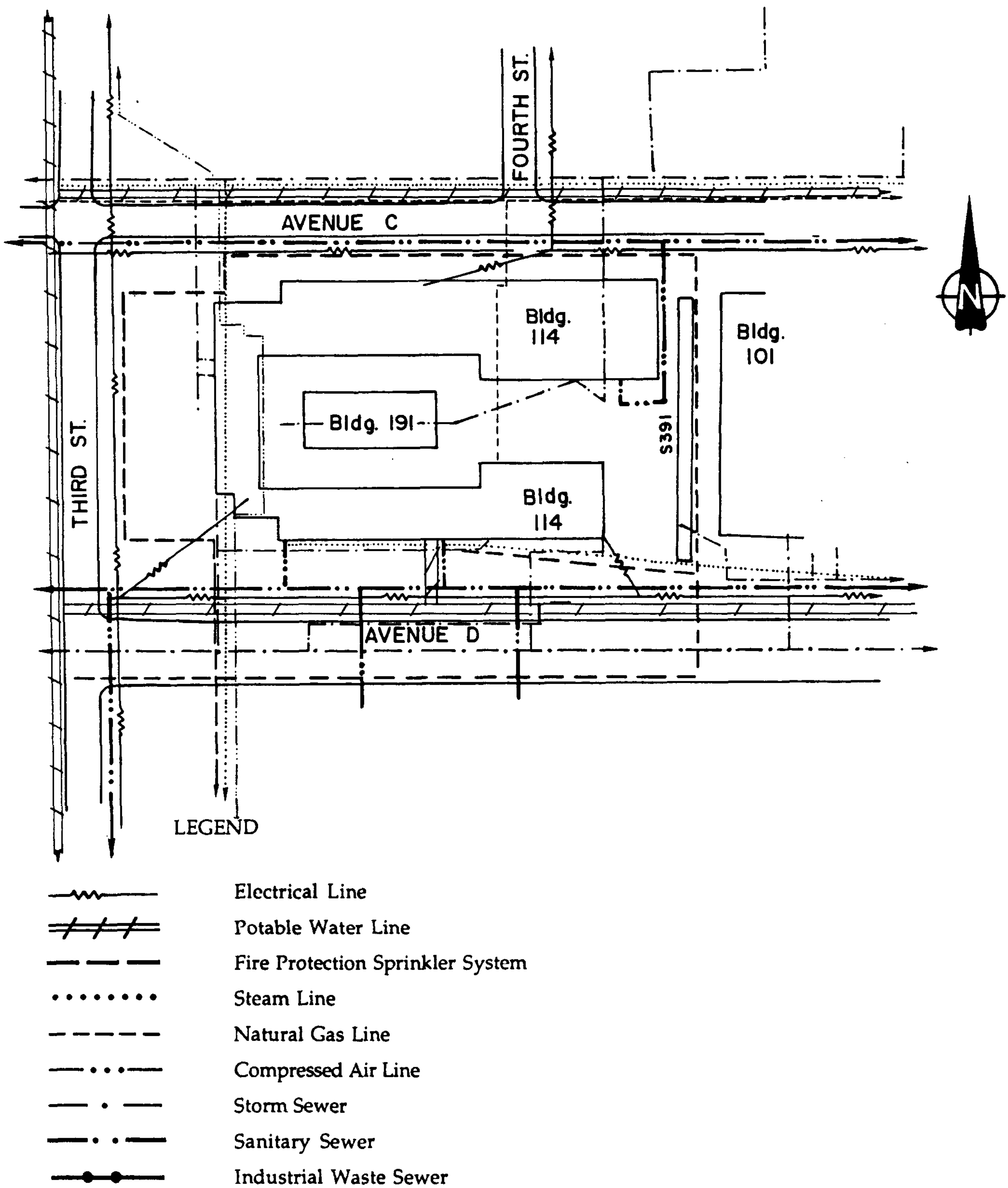


Figure 3.10.1. Building 114 buried utility schematic.

SOURCE:
- BEST AVAILABLE U.S. NAVY BLUEPRINT

NOT TO SCALE

CanonieEnvironmental

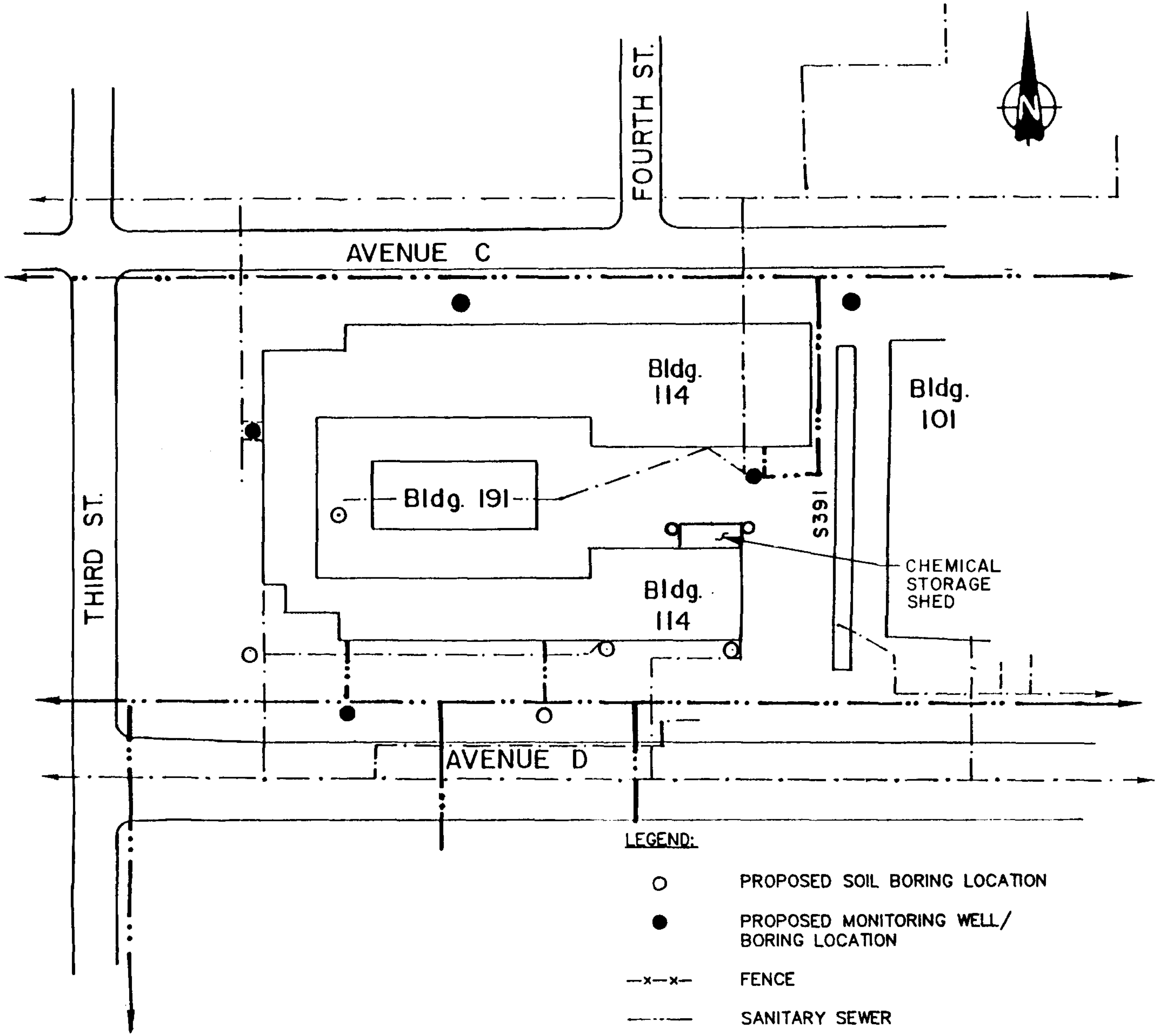


Figure 3.10.2. Building 114 sampling locations.

SOURCE:
- BEST AVAILABLE U.S. NAVY BLUEPRINT

NOT TO SCALE

Canonie Environmental

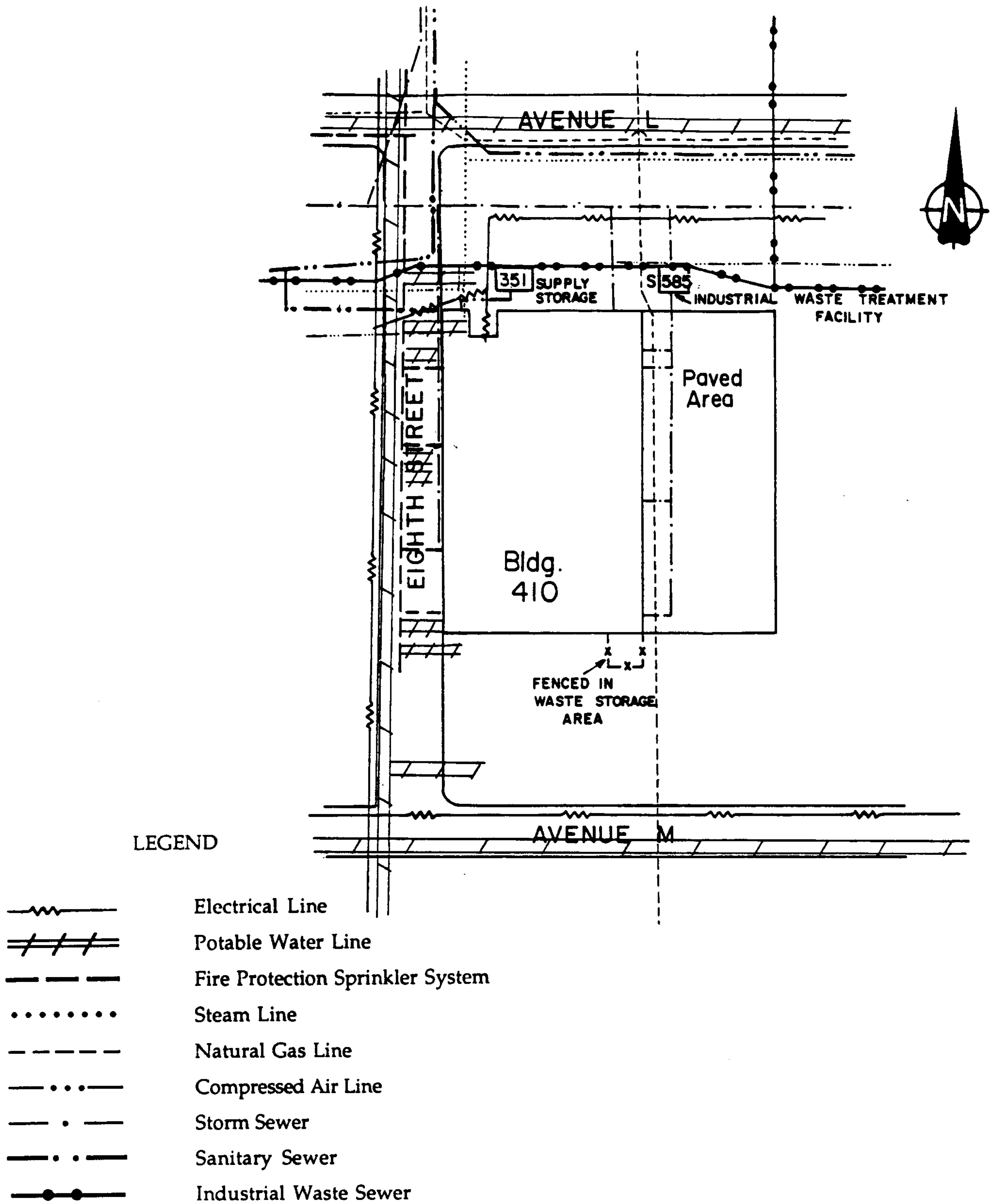


Figure 3.11.1. Building 410 buried utility schematic.

SOURCE:
- BEST AVAILABLE U.S. NAVY BLUEPRINT

NOT TO SCALE

Canonie Environmental

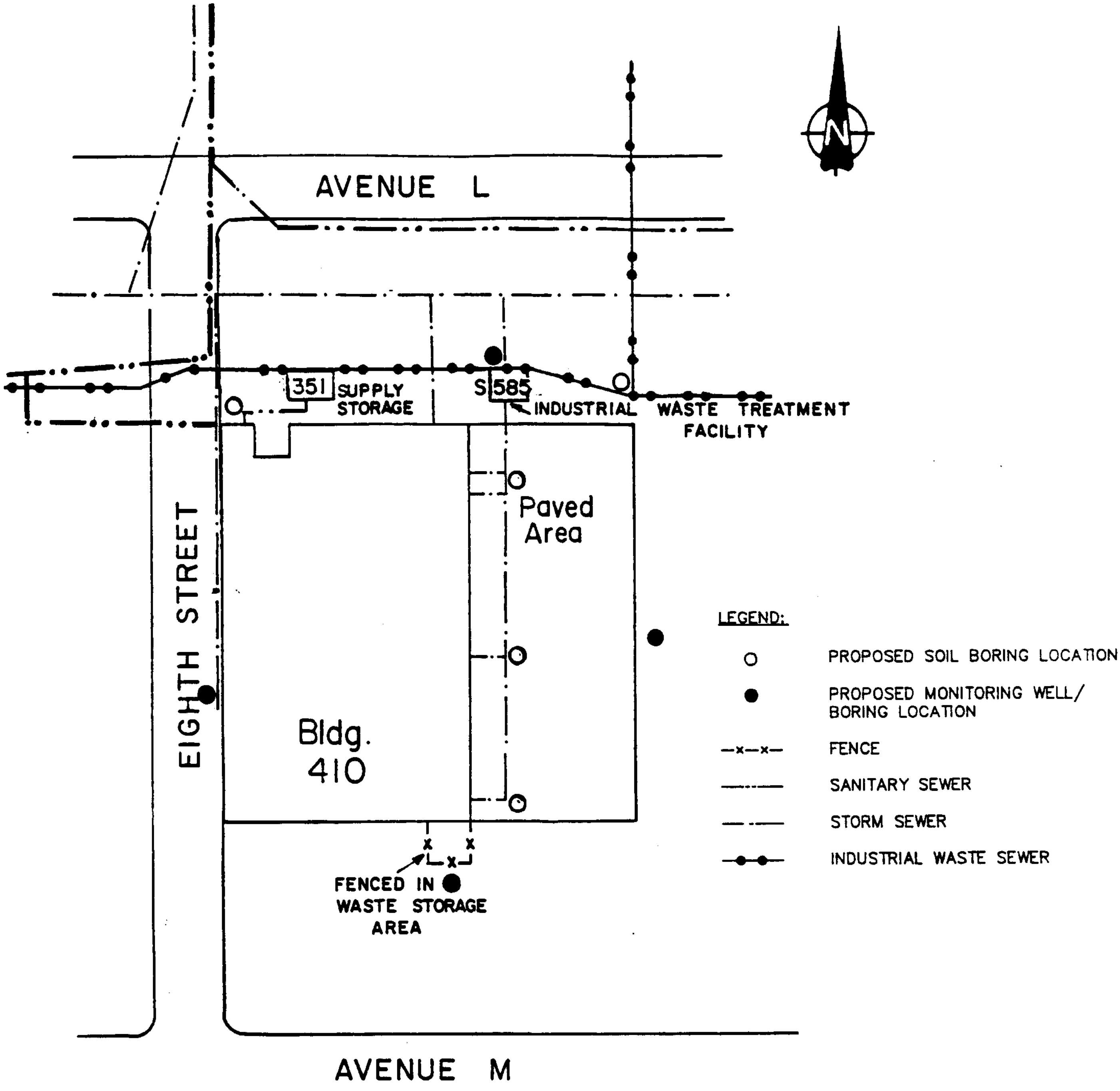
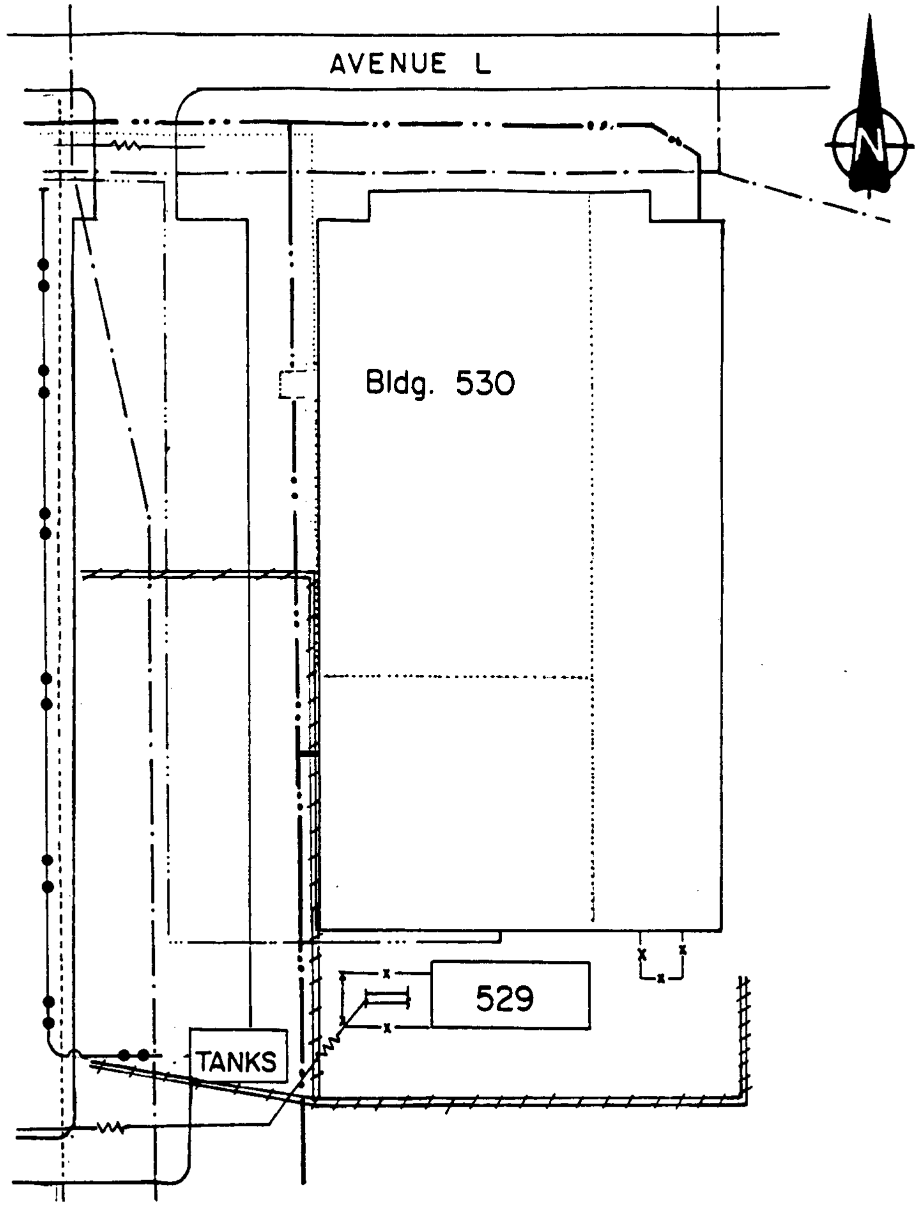


Figure 3.11.2. Building 410 sampling locations.

SOURCE:
- BEST AVAILABLE U.S. NAVY BLUEPRINT

NOT TO SCALE

CanonieEnvironmental



LEGEND

—⁄\⁄\⁄—	Electrical Line
═╪═╪═╪═	Potable Water Line
— — —	Fire Protection Sprinkler System
• • • • • • • •	Steam Line
- - - - -	Natural Gas Line
—• • •—	Compressed Air Line
— • —	Storm Sewer
—• •—	Sanitary Sewer
—●—●—	Industrial Waste Sewer

Figure 3.12.1. Building 530 buried utility schematic.

SOURCE:
- BEST AVAILABLE U.S. NAVY BLUEPRINT

NOT TO SCALE

CanonieEnvironmental

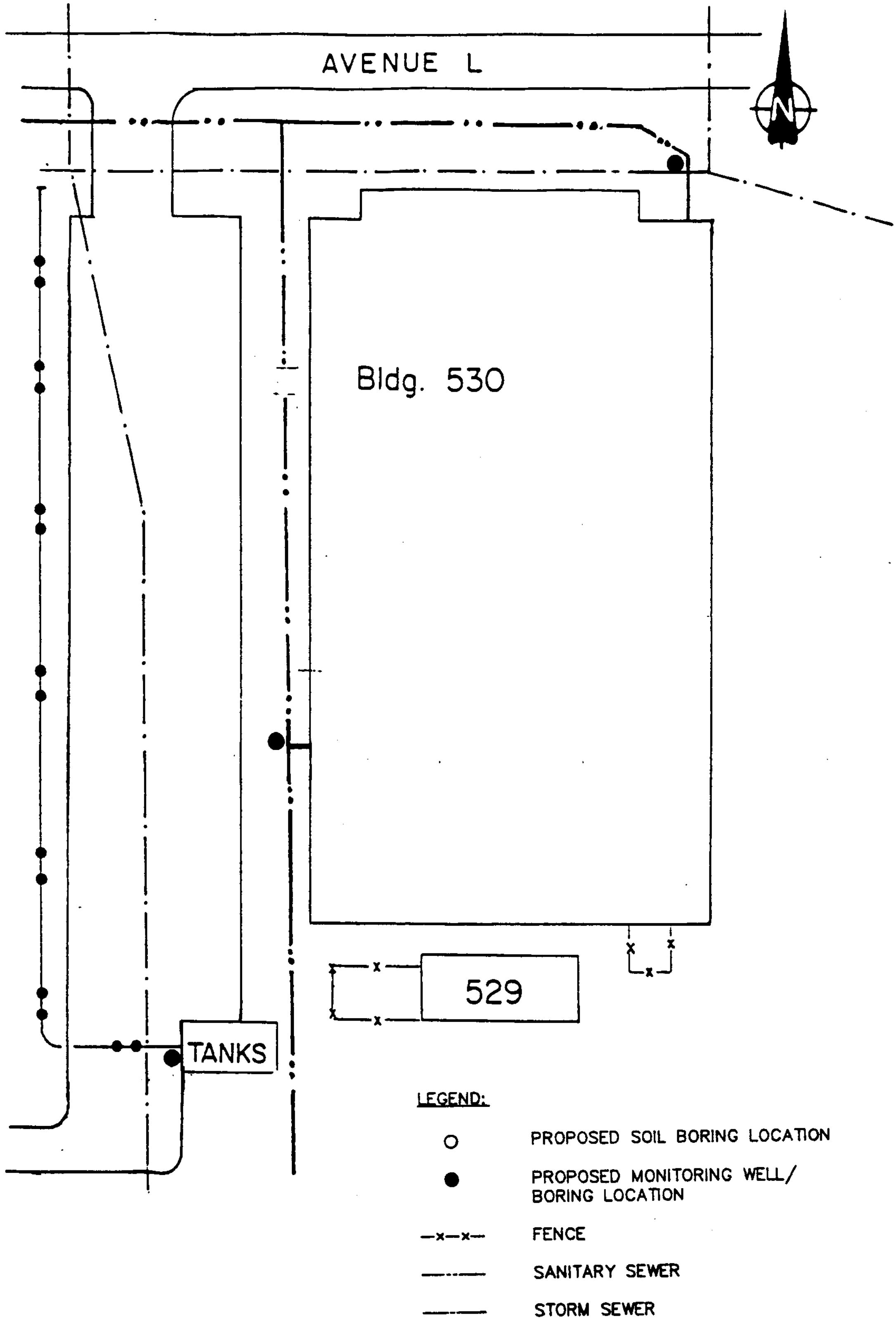
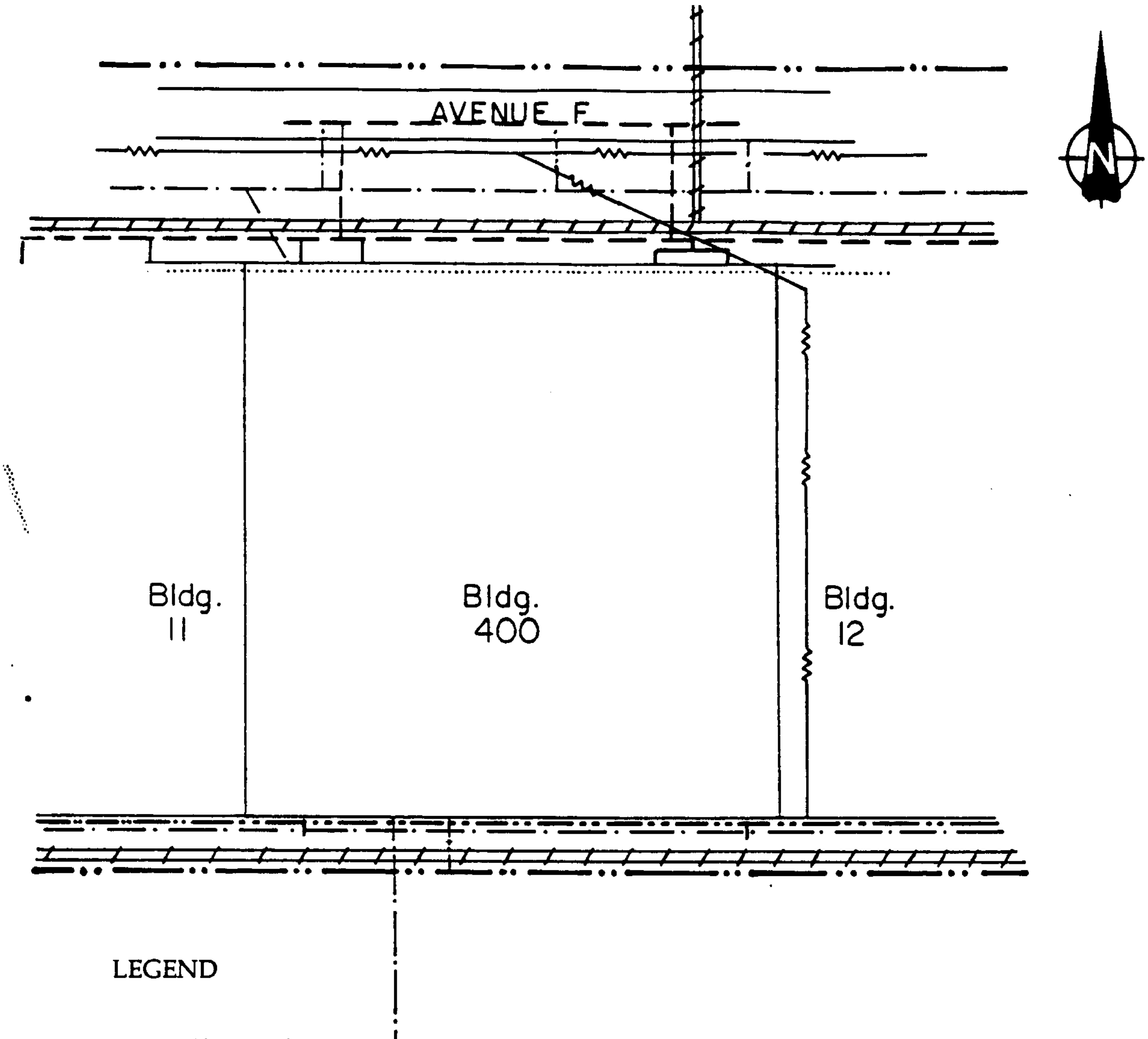


Figure 3.12.2. Building 530 sampling locations.

NOT TO SCALE

SOURCE:
- BEST AVAILABLE U.S. NAVY BLUEPRINT

Canonie Environmental



LEGEND

- Electrical Line
- Potable Water Line
- Fire Protection Sprinkler System
- Steam Line
- Natural Gas Line
- Compressed Air Line
- Storm Sewer
- Sanitary Sewer
- Industrial Waste Sewer

Figure 3.13.1. Building 400 buried utility schematic.

SOURCE:
- BEST AVAILABLE U.S. NAVY BLUEPRINT

NOT TO SCALE

Canonie Environmental

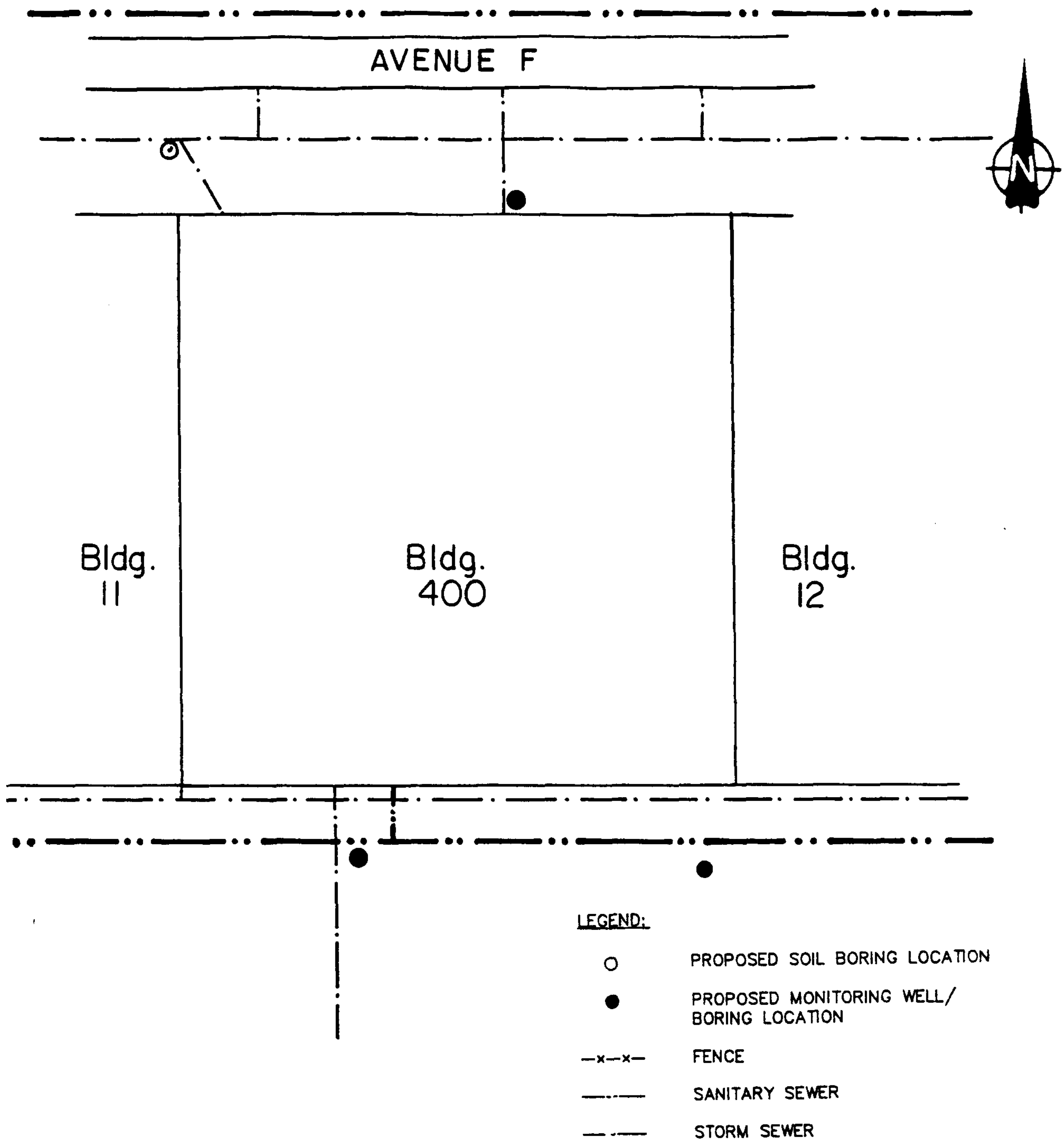


Figure 3.13.2. Building 400 sampling locations.

SOURCE:
- BEST AVAILABLE U.S. NAVY BLUEPRINT

NOT TO SCALE

CanonieEnvironmental

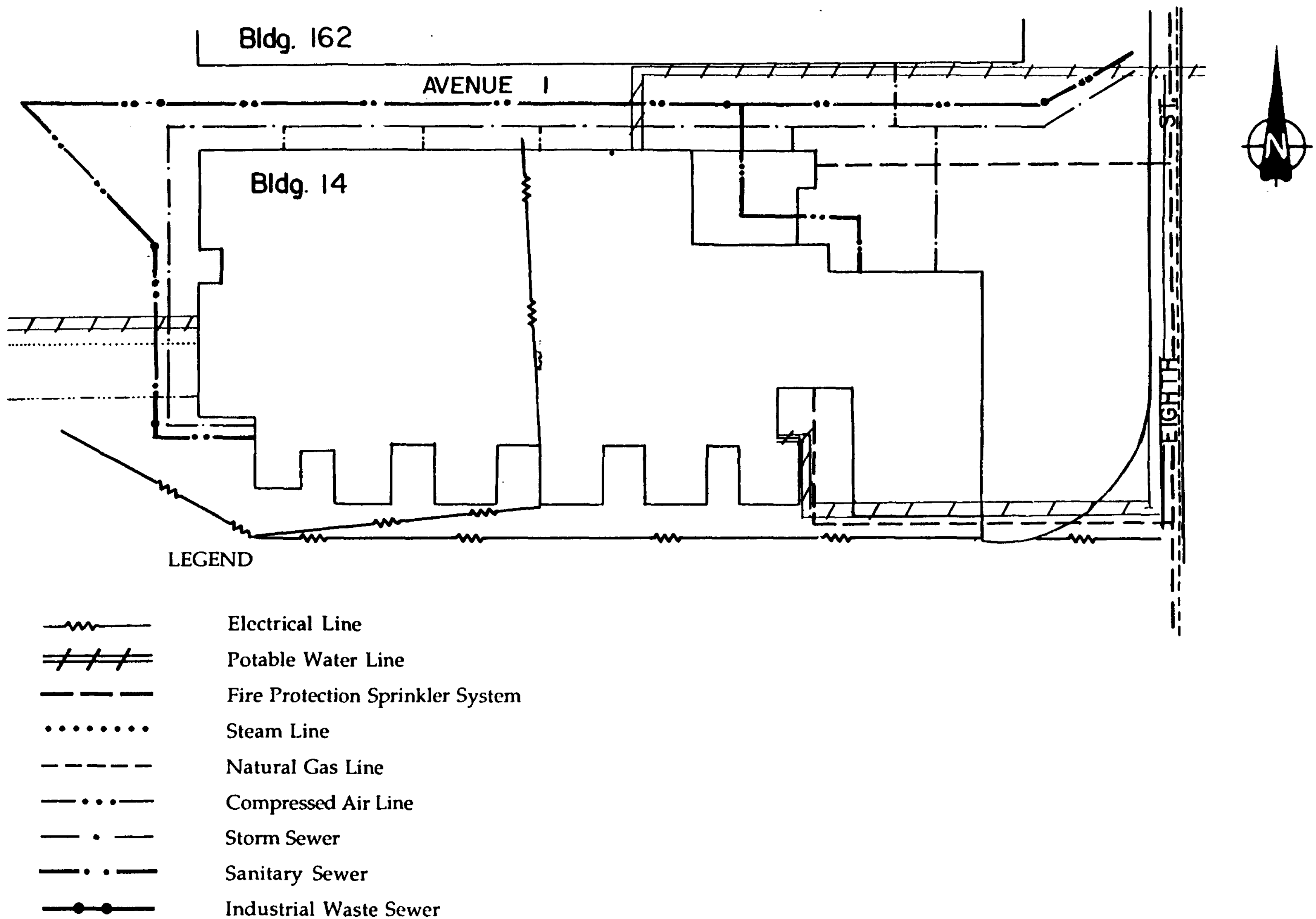


Figure 3.14.1. Building 14 buried utility schematic.

SOURCE:
- BEST AVAILABLE U.S. NAVY BLUEPRINT

NOT TO SCALE

Canonie Environmental

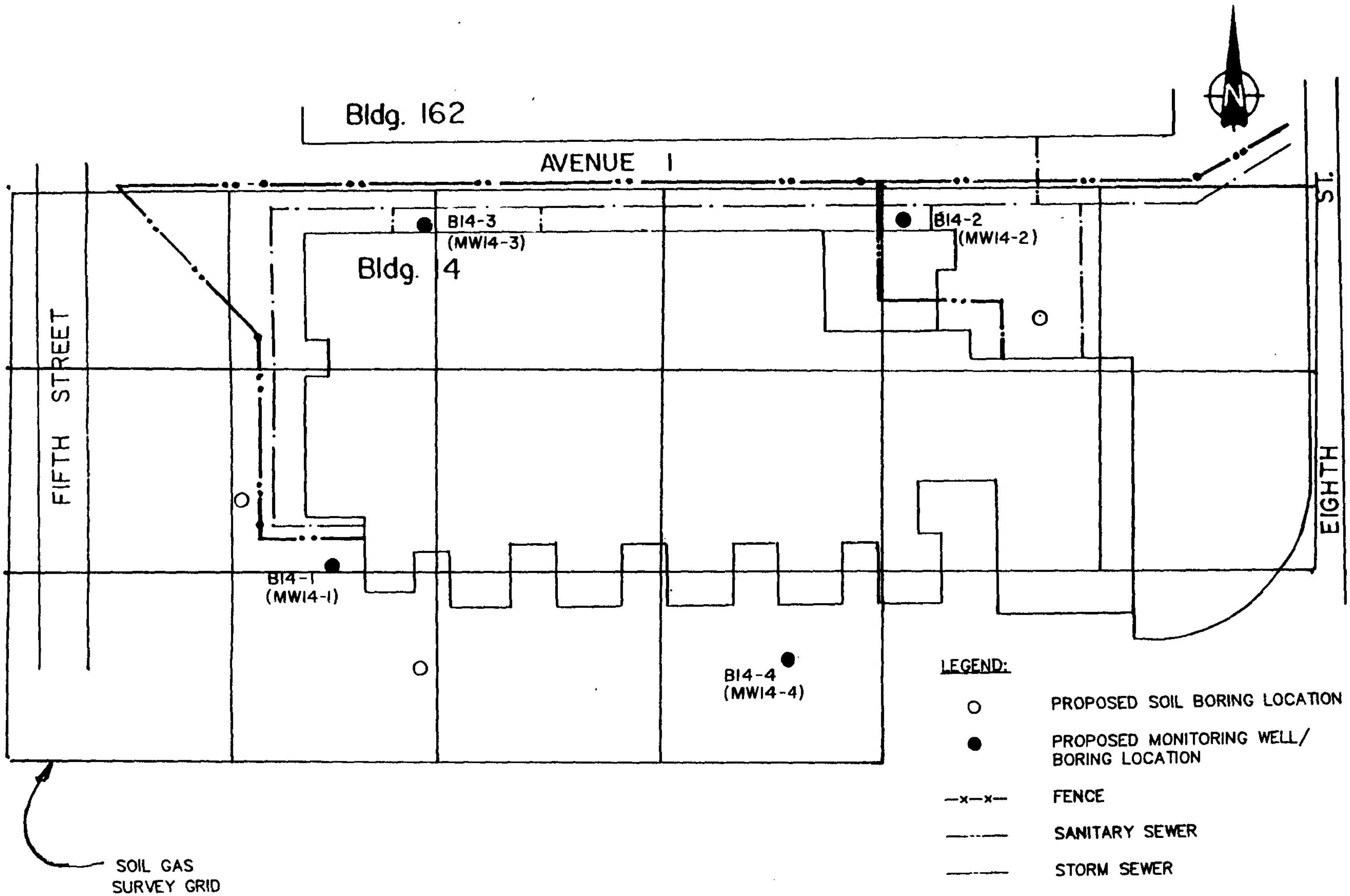
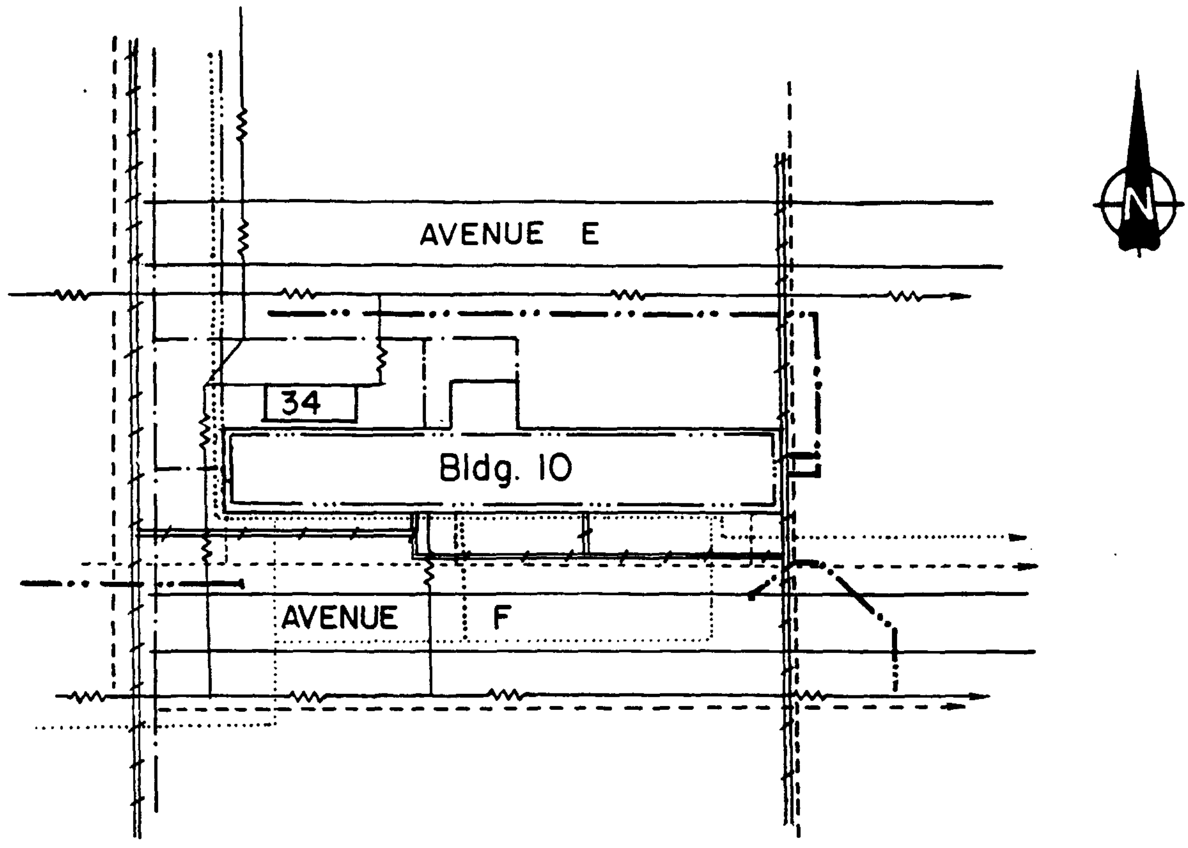


Figure 3.14.2. Building 14 sampling locations.

SOURCE:
- BEST AVAILABLE U.S. NAVY BLUEPRINT

NOT TO SCALE

Canonie Environmental



LEGEND

Electrical Line
Potable Water Line
Fire Protection Sprinkler System
Steam Line
Natural Gas Line
Compressed Air Line
Storm Sewer
Sanitary Sewer
Industrial Waste Sewer

Figure 3.15.1. Building 10 buried utility schematic.

SOURCE:
- BEST AVAILABLE U.S. NAVY BLUEPRINT

NOT TO SCALE

CanonieEnvironmental

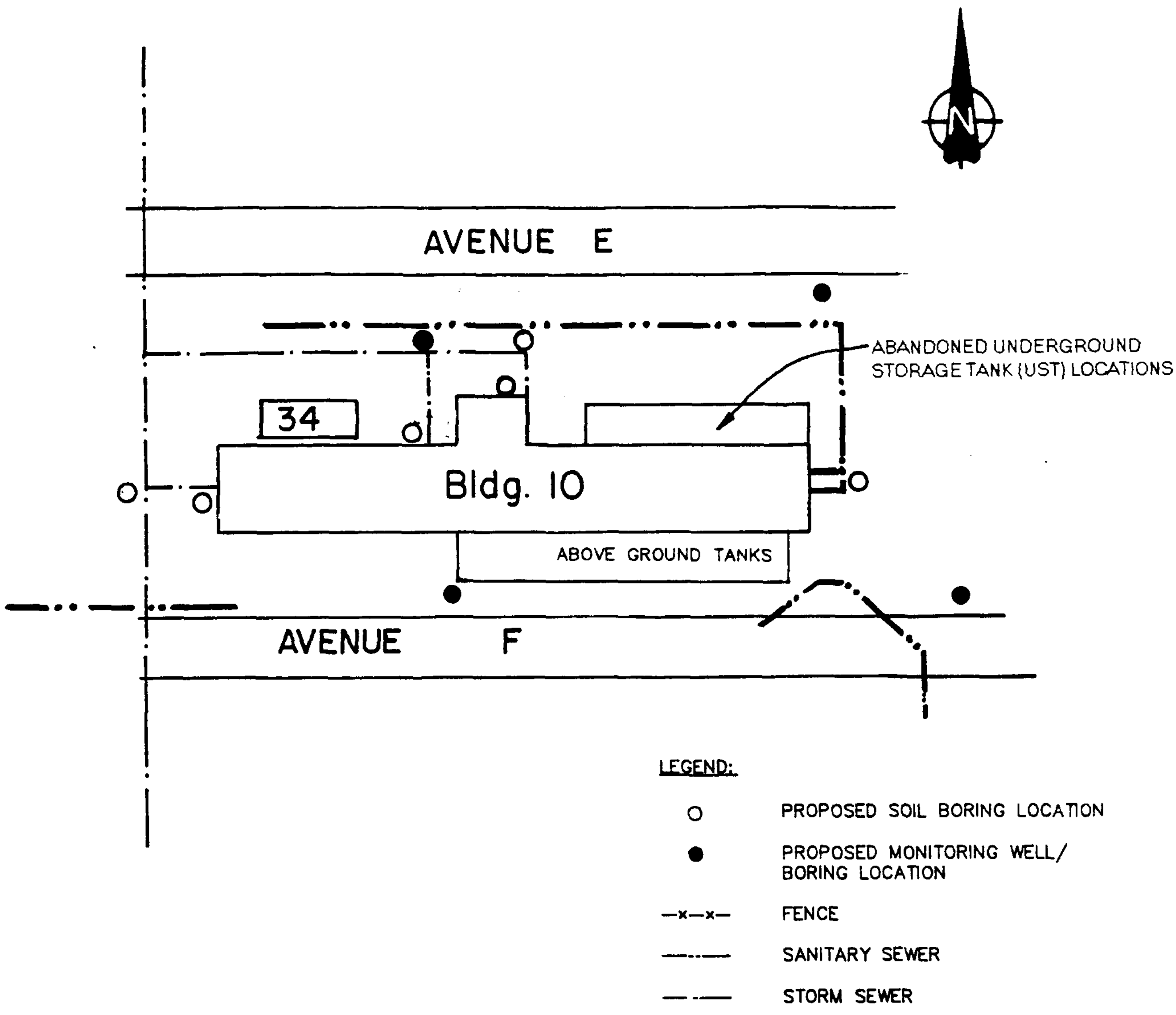


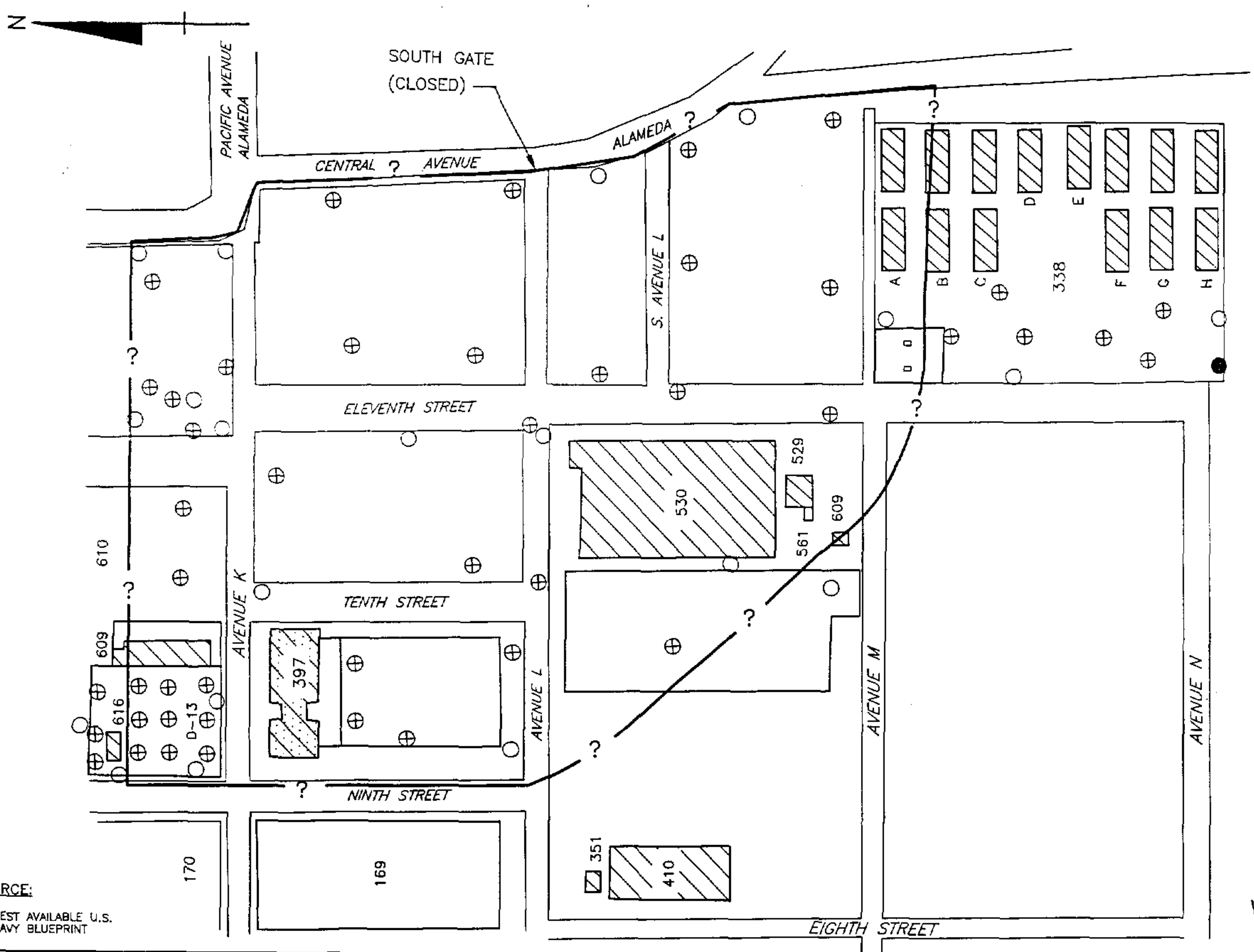
Figure 3.15.2. Building 10 sampling locations.

SOURCE:
- BEST AVAILABLE U.S. NAVY BLUEPRINT

NOT TO SCALE

CanonieEnvironmental

DRAWING NUMBER 86-018-B64



LEGEND:

⊕ PROPOSED SOIL BORING

○ PROPOSED MONITORING WELL

● EXISTING MONITORING WELL

–?– APPROXIMATE BOUNDARY OF FORMER OIL REFINERY SITE

SCALE

200 0 200 FEET

SOURCE:

BEST AVAILABLE U.S. NAVY BLUEPRINT

OIL REFINERY SITE
NAVAL AIR STATION
ALAMEDA, CALIFORNIA

PREPARED FOR

WESTERN DIVISION NAVAL FACILITIES
ENGINEERING COMMAND
SAN BRUNO, CALIFORNIA

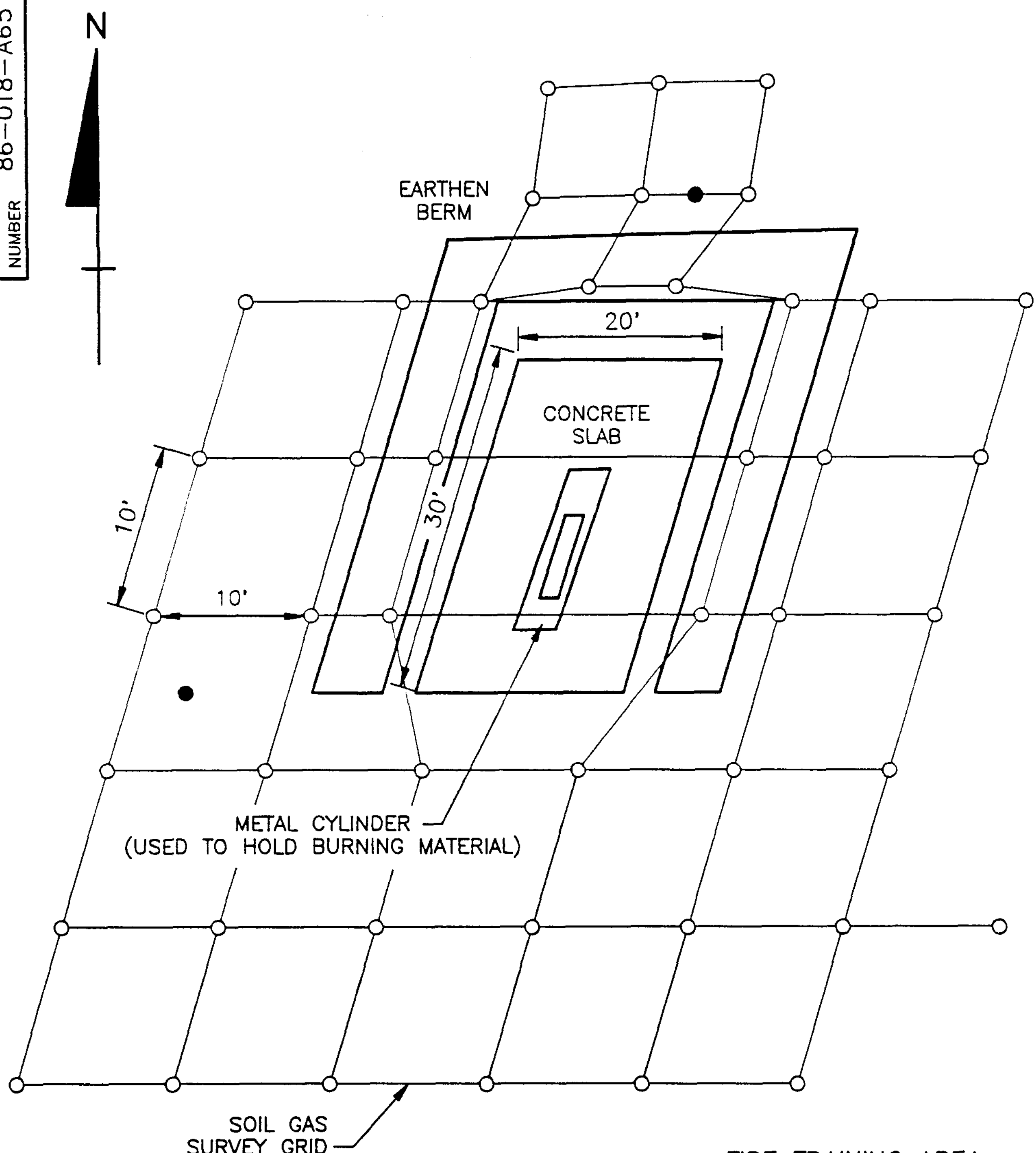
CanonieEnvironmental

No.	DATE	ISSUE / REVISION	DWN. BY	CK'D BY	AP'D BY
2	2-2-90	ADDED ADDITIONAL WELLS	KCH	TGB	
1	1-15-90	ORIGINAL ISSUE	KCH	TGB	

DATE: 1-13-90	FIGURE 3.16.1.	DRAWING NUMBER 86-018-B64
SCALE: AS SHOWN		

2

DRAWING NUMBER 86-018-A65



LEGEND:

- ● PROPOSED MONITORING WELL LOCATION
- ○ PROPOSED SOIL GAS SURVEY POINT

SOURCE:

BEST AVAILABLE U.S. NAVY BLUEPRINT

FIRE TRAINING AREA
SAMPLING LOCATIONS
NAVAL AIR STATION
ALEMEDA, CALIFORNIA

PREPARED FOR

WESTERN DIVISION NAVAL FACILITIES
ENGINEERING COMMAND
SAN BRUNO, CALIFORNIA

Canonie Environmental

No.	DATE	ISSUE / REVISION	DWN. BY	CK'D BY	AP'D BY
△	1-12-90		KCH	TGB	

DATE: 1-12-90
SCALE: NTS

FIGURE 3.17.1.

DRAWING NUMBER 86-018-A65

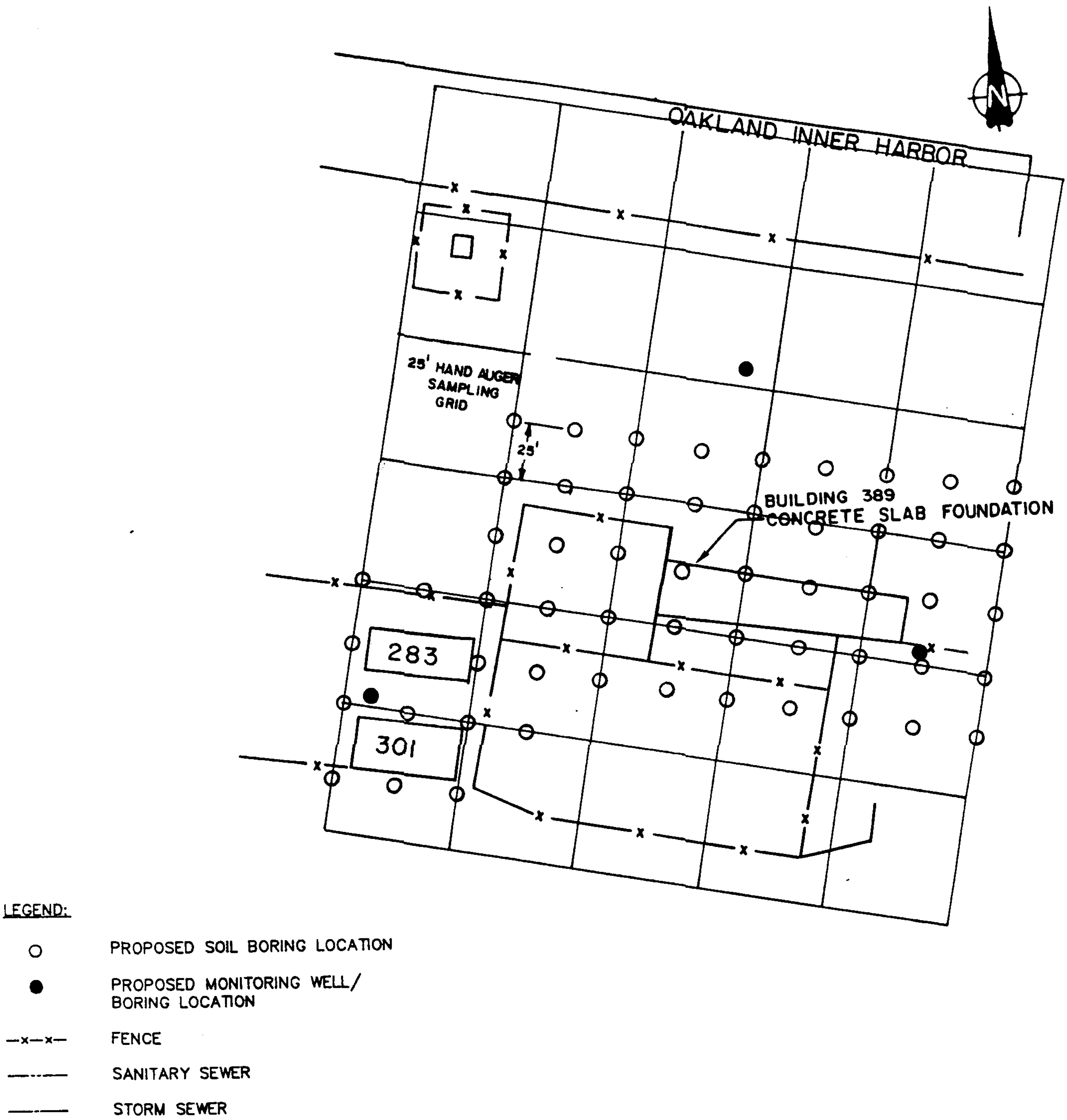
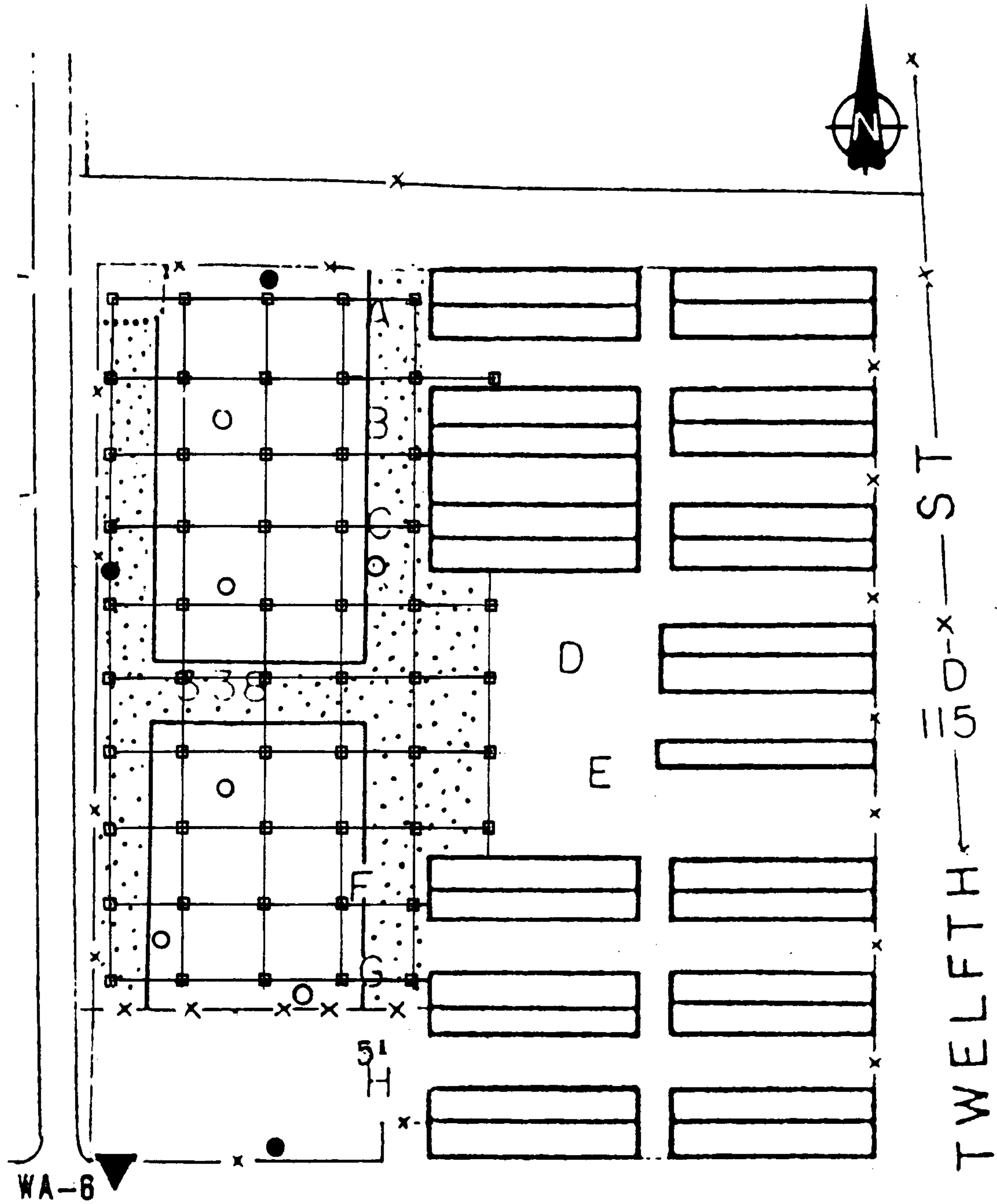


Figure 3.18.1. Building 301 and 389 sampling locations.

SOURCE:
- BEST AVAILABLE U.S NAVY BLUEPRINT

NOT TO SCALE

Canonie Environmental



LEGEND:

☐ PROPOSED AUGER SAMPLING POINTS

▼ EXISTING MONITORING WELL (WAHLER AND ASSOCIATES 1985)

○ PROPOSED SOIL BORING

● PROPOSED MONITORING WELL

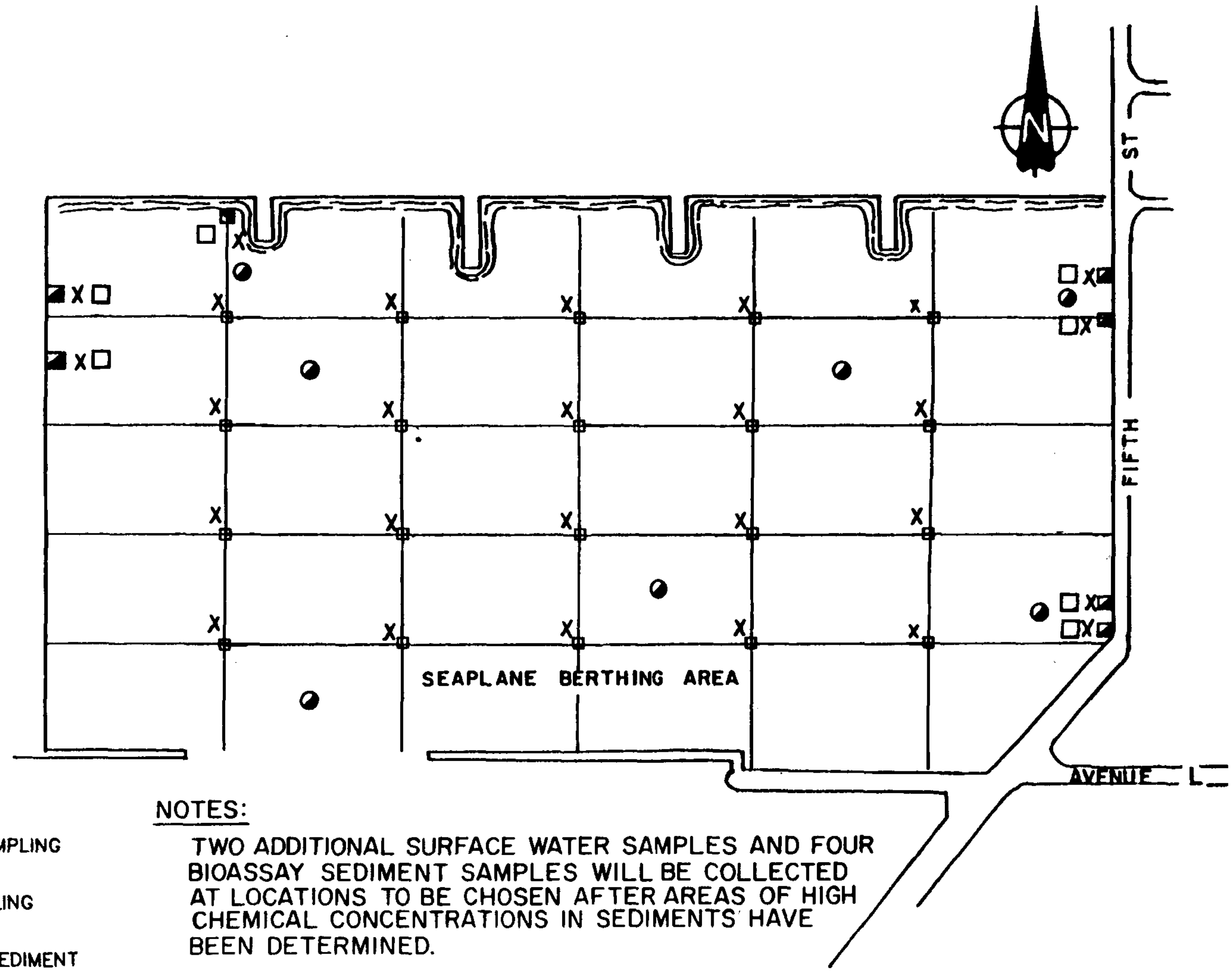
—x—x— FENCE

Figure 3.19.1. Cans C-2 area sampling locations.

SOURCE:
- BEST AVAILABLE U.S. NAVY BLUEPRINT

NOT TO SCALE

Canonie Environmental



LEGEND:

- □ PROPOSED SEDIMENT SAMPLING LOCATION
- × PROPOSED WATER SAMPLING LOCATION
- ◐ PROPOSED BIO-ASSAY SEDIMENT SAMPLING LOCATION
- ◪ EXISTING OUTFALL LOCATION

NOTES:

TWO ADDITIONAL SURFACE WATER SAMPLES AND FOUR BIOASSAY SEDIMENT SAMPLES WILL BE COLLECTED AT LOCATIONS TO BE CHOSEN AFTER AREAS OF HIGH CHEMICAL CONCENTRATIONS IN SEDIMENTS HAVE BEEN DETERMINED.

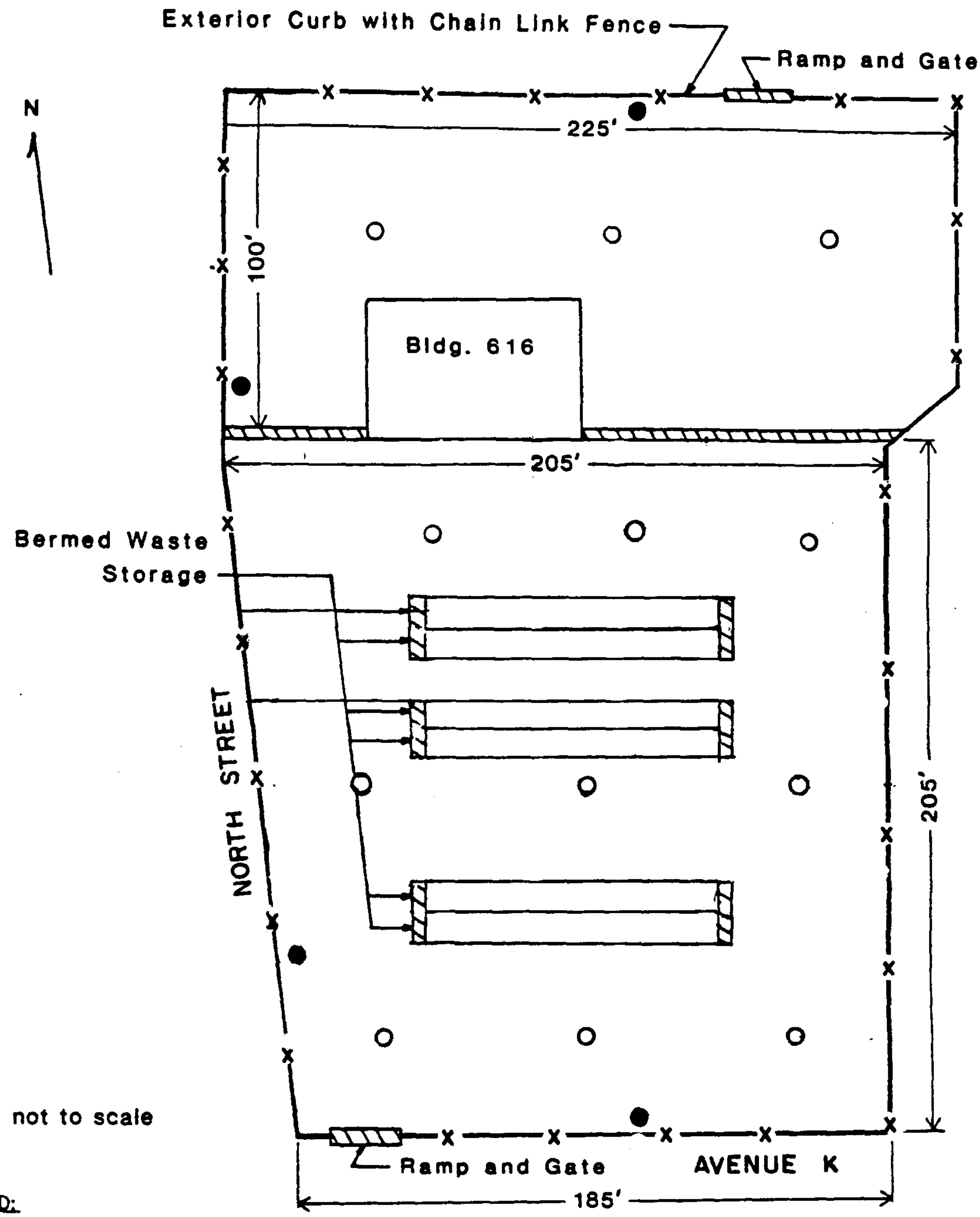
Figure 3.20.1. Seaplane lagoon sampling locations.

SOURCE:

- BEST AVAILABLE U.S NAVY BLUEPRINT

NOT TO SCALE

Canonie Environmental



LEGEND:

○ PROPOSED SOIL BORING LOCATION

● PROPOSED MONITORING WELL/ BORING LOCATION

—x—x— FENCE

▭ - Ramps/Rounded Berms

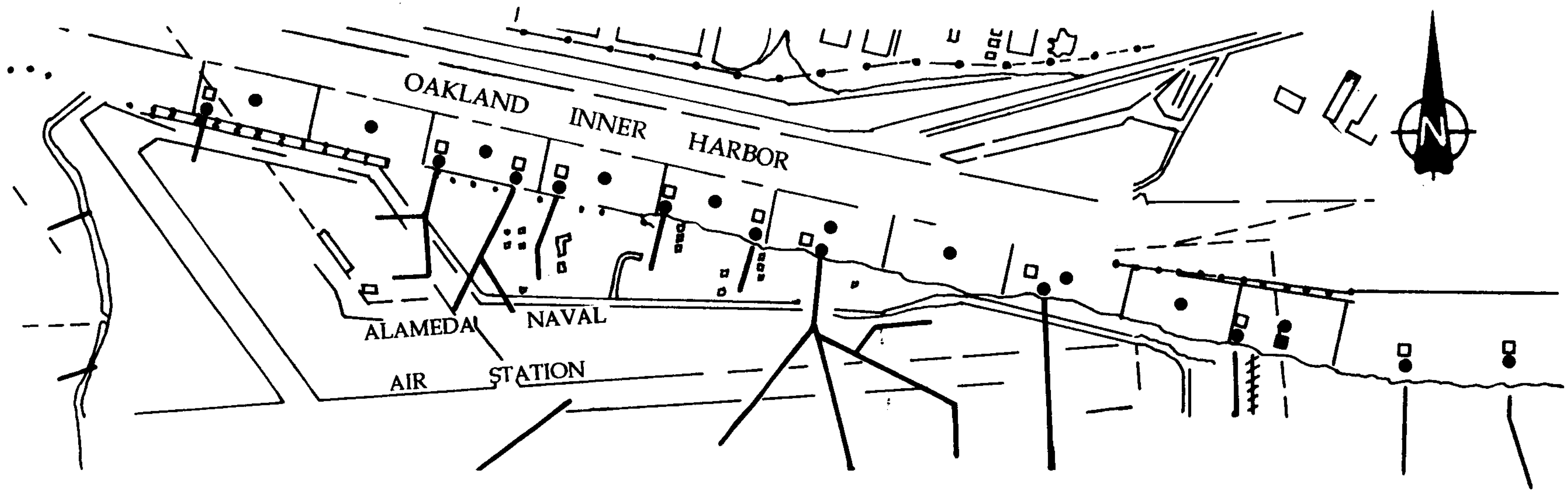
Bermed Waste Storage Areas are 7' x 90' with 4" high Asphalt Curbs

Figure 3.22.1. Yard D13 sampling locations.

SOURCE:
- BEST AVAILABLE U.S NAVY BLUEPRINT

NOT TO SCALE

CanonieEnvironmental



LEGEND:

- ● PROPOSED SEDIMENT SAMPLING LOCATION
- ■ PROPOSED BIO-ASSAY SEDIMENT SAMPLING LOCATION
- □ PROPOSED SURFACE WATER SAMPLING LOCATION
- STORM SEWER
- SANITARY SEWER

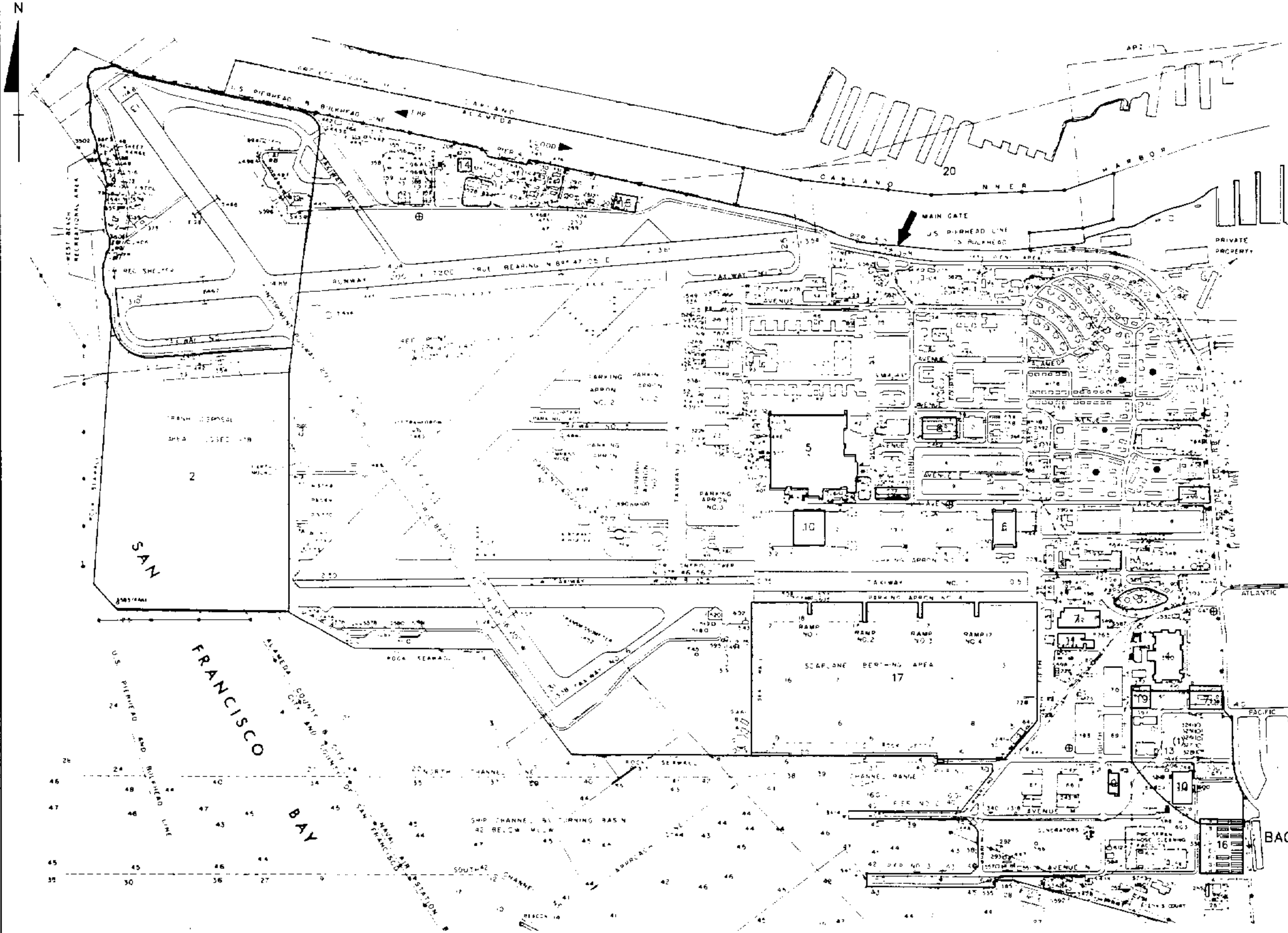
Note: Three additional bioassay sediment samples will be collected at locations chosen after areas of high chemical concentrations detected in sediments have been determined.

Figure 3.23.1. Estuary sampling locations.

SOURCE:
- BEST AVAILABLE U.S. NAVY BLUEPRINT

NOT TO SCALE

Canonie Environmental



NOTES:

1. THE AREA OF SITE 13 INCLUDES THE AREAS OF SITES 10 AND 16.

LEGEND:

SITE NO.	SITE DESCRIPTION
1	1943–1956 DISPOSAL SITE
2	WEST BEACH LANDFILL
3	AREA 97 (AVIATION GASOLINE TANKS)
4	BUILDING 360 (PLATING SHOP, ENGINE CLEANING SHOP, PAINT SHOP, AND PAINT STRIPPING SHOP)
5	BUILDING 5 (PLATING SHOP, PAINT STRIPPING SHOP, CLEANING SHOP, AND PAINT SHOP)
6	BUILDING 41 (AIRCRAFT INTERMEDIATE MAINTENANCE DEPT.)
7	BUILDING 162, 459, AND 547 (SERVICE STATIONS)
8	BUILDING 114 (PEST CONTROL AREA AND SEPARATOR PIT)
9	BUILDING 410 (PAINT STRIPPING)
10	BUILDINGS 400 AND 530 (MISSILE REWORK OPERATIONS)
11	BUILDING 14 (ENGINE TEST CELL)
12	BUILDING 10 (POWER PLANT)
13	OIL REFINERY
14	FIRE TRAINING AREA
15	BUILDINGS 301 AND 389 (STORAGE AREA)
16	CANS C-2 AREA
17	SEAPLANE LAGOON
18	STATION SEWER SYSTEM (NOT ON SITE)
19	YARD D-13 (HAZARDOUS WASTE SOLVENTS)
20	ESTUARY (OAKLAND INNER HARBOR)
⊕	PROPOSED BACKGROUND SOIL BORING/ MONITORING WELL LOCATION

SCALE
500 0 500 1000 FEET

BACKGROUND SAMPLING LOCATIONS
NAVAL AIR STATION
ALAMEDA, CALIFORNIA

PREPARED FOR

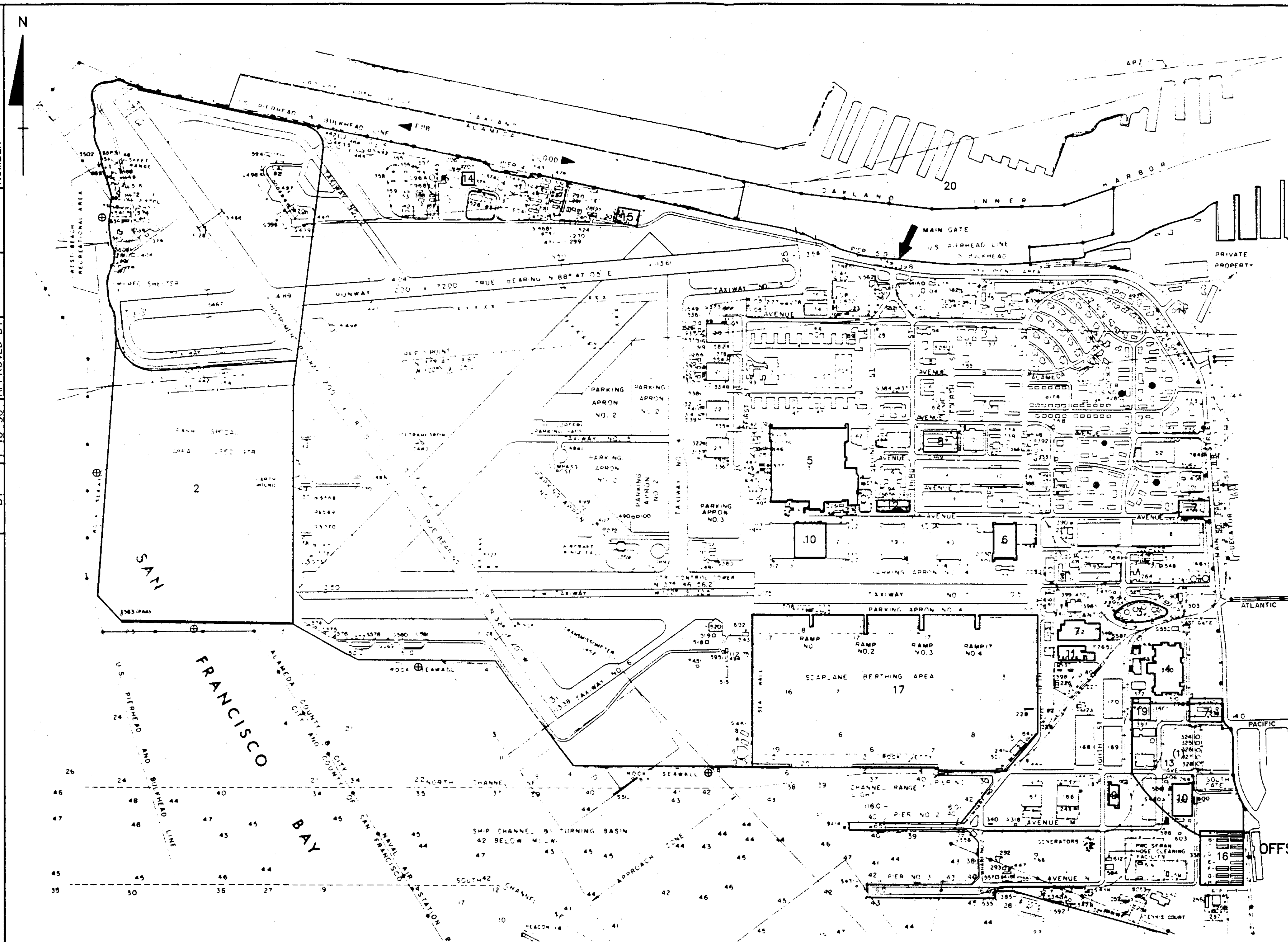
WESTERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
SAN BRUNO, CALIFORNIA

CanonieEnvironmental

DATE:	12-21-89	FIGURE 3.25.1	DRAWING NUMBER	REV.
SCALE:	AS SHOWN		86-018-E62	⚠

No.	DATE	ISSUE / REVISION	DWN. BY	CK'D BY	AP'D BY
⚠	12-21-89	ISSUED FOR REPORT	KCH	TGB	RJG

DRAWING NUMBER 86-018-E62
DRAWN BY KCH 12-21-89
CHECKED BY TGB
APPROVED BY



NOTES:

1. THE AREA OF SITE 13 INCLUDES THE AREAS OF SITES 10 AND 16.

LEGEND:

SITE NO.	SITE DESCRIPTION
1	1943–1956 DISPOSAL SITE
2	WEST BEACH LANDFILL
3	AREA 97 (AVIATION GASOLINE TANKS)
4	BUILDING 360 (PLATING SHOP, ENGINE CLEANING SHOP, PAINT SHOP, AND PAINT STRIPPING SHOP)
5	BUILDING 5 (PLATING SHOP, PAINT STRIPPING SHOP, CLEANING SHOP, AND PAINT SHOP)
6	BUILDING 41 (AIRCRAFT INTERMEDIATE MAINTENANCE DEPT.)
7	BUILDING 162, 459, AND 547 (SERVICE STATIONS)
8	BUILDING 114 (PEST CONTROL AREA AND SEPARATOR PIT)
9	BUILDING 410 (PAINT STRIPPING)
10	BUILDINGS 400 AND 530 (MISSILE REWORK OPERATIONS)
11	BUILDING 14 (ENGINE TEST CELL)
12	BUILDING 10 (POWER PLANT)
13	OIL REFINERY
14	FIRE TRAINING AREA
15	BUILDINGS 301 AND 389 (STORAGE AREA)
16	CANS C–2 AREA
17	SEAPLANE LAGOON
18	STATION SEWER SYSTEM (NOT ON SITE)
19	YARD D–13 (HAZARDOUS WASTE SOLVENTS)
20	ESTUARY (OAKLAND INNER HARBOR)
⊕	OFFSHORE SAMPLING LOCATIONS (SURFACE WATER AMD SEDIMENT SAMPLING LOCATIONS)

SCALE
500 0 500 1000 FEET

OFFSHORE SAMPLING LOCATIONS
NAVAL AIR STATION
ALAMEDA, CALIFORNIA

PREPARED FOR

WESTERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
SAN BRUNO, CALIFORNIA

CanonieEnvironmental

DATE:	1-10-90	FIGURE 3.26.1	DRAWING NUMBER 86-018-E63	REV. △
SCALE:	AS SHOWN			

No.	DATE	ISSUE / REVISION	DWN. BY	CK'D BY	AP'D BY
△	1-10-90	ISSUED FOR REVIEW	TGK	TGB	RJG

DRAWING NUMBER 86-018-E63
DRAWN BY TGK 1-10-90
CHECKED BY / APPROVED BY

CAD 86-018-E60 VZC 10-4-89

APPENDIX A

NAVY RESPONSES TO THE COMMENTS FROM THE
DEPARTMENT OF HEALTH SERVICES

APPENDIX A

NAVY RESPONSES TO THE COMMENTS FROM THE DEPARTMENT OF HEALTH SERVICES

This appendix provides the Navy's responses to the comments made by the California Department of Health Services (DHS) concerning the Sampling Plan, Volume 1 of the Remedial Investigation Feasibility Study (RI/FS) Work Plan for the Naval Air Station Alameda (NAS Alameda) in Alameda, California.

A. General Comments On Presentation Of Figures

Comment 1

Several figures do not adequately identify the difference between existing and proposed monitor wells. Since placement of the borings and wells will be determined "in the field", please add the word "proposed" before the words "boring location" and "monitor well/boring location" in the legends for all the figures.

Response 1

The figures have been modified to reflect this comment.

Comment 2

Ensure that scales are on all figures.

Response 2

The figures presented in the sampling plan have notes which state that the figures are "not to scale". These figures were provided for the limited purpose of illustrating approximate utility locations, existing landmarks, and proposed sampling points. Placing scales on these figures could lead to use of the figures for measurements that would be inaccurate and misleading. During the course of the field investigations, accurate measurements will be made and more precise site plans are planned for the RI/FS reports.

Comment 3

Abbreviations should be spelled out in the legend if they are used in the figure (ie. OW-7, WA-8) or an acronym list should be provided.

Response 3

Abbreviations including "OW" and "WA" represent acronyms for the phrases "observation well" and "Wahler Associates", respectively. These abbreviations specifically refer to wells that were installed during previous field investigations by other consulting firms, including Kennedy Engineers and Wahler Associates. Spelling out these abbreviations would therefore not shed light on their present functions or on the objectives of the Sampling Plan.

Comment 4

A standardized format identifying monitor wells and borings should be adopted by the Navy for all their contractors to follow instead of having several different formats (ie. OW, WA, MW). All existing wells should be changed to the accepted standard format.

Response 4

In the discussion of this comment at the meeting January 19, 1990, DHS agreed to drop this request. The identification of existing wells will not be changed to a new standard format.

B. Comments On Specific Figures

Comment 1

Figure 1-2 Remedial Investigation/Feasibility Study Site Map. The scale should be changed to 1"=500'. The map should be larger for more detail. A map with 1"=500' or a larger scale will allow easier and more accurate presentation of soil contamination, groundwater contamination, and groundwater contours.

Response 1

The Figure 1-2 map scale has been modified to a scale of 1 inch equals 500 feet.

Comment 2

Figure 2.4 Generalized monitor well construction diagram. The construction diagram shows "low permeability backfill" where "bentonite-cement grout"should be.

Response 2

Figure 2.4 has been modified to reflect this comment.

Comment 3

Figure 3.3.1 Area 97 sampling locations. The legend does not indicate if the Kennedy and Wahler Associates markings represent monitor wells or borings. Please identify if they are monitor wells or soil borings. Does OW stand for Observation Well? What does WA stand for? Please define these acronyms.

Response 3

As discussed in Section 3.3.1.3 of the Sampling Plan and Response No. 3 in Section A of this appendix, the map symbols on figure 3.3.1 represent existing monitoring wells installed by these other consultants, mentioned above. Figure 3.3.1 has been modified to clarify that these are well locations.

Comment 4

Figure 3.4.2 Building 360 sampling locations. Is the building outline correct or does a wing extend to the west in the center of the building as in Figure 3.4.1?

Response 4

A building wing is present along the west central portion of Building 360, as shown of Figure 3.4.1. Figure 3.4.2 has been modified to illustrate this wing.

Comment 5

Figure 3.9.2 Building 162 sampling locations. See comments under Figure 3.3.1

Response 5

Figure 3.9.2 has been modified to show that the acronyms "OW" and "WA" represent "observation well" and "Wahler and Associates," respectively.

Comment 6

Figure 3.15.2 Building 10 sampling locations. This figure should show the location of the eight above-ground fuel storage tanks and the abandoned USTs.

Response 6

Figure 3.15.2 has been modified to illustrate the locations of these existing above-ground tanks and abandoned USTs.

Comment 7

Figure 3.16.1 Oil refinery site. A larger map scale should be used to show more detail. The Department also suggests that two maps be made of this site. One map should show existing and proposed monitor wells while the second map should depict existing and proposed soil boring locations.

Response 7

For purposes of illustrating proposed locations during this planning phase of the sampling plan, one map has been prepared to illustrate both proposed and existing monitoring wells and soil boring locations as shown on Figure 3.16.1. Future reports presenting the results from the RI/FS sampling will use two figures to show boring and well locations at this site.

Comment 8

Figure 3.20.1 Seaplane Lagoon Sampling Locations. Add the locations of the five outfalls to the map. DHS comments on the related section request four more sediment sampling points. Those points should also be included in this figure.

Response 8

Figure 3.20.1 has been modified to reflect this comment.

C. General Comments On Analytical Methods And Sampling Analysis

Comment 1

Use of the EPA method 624 (Gas Chromatograph/Mass Spectrometer-GC/MS) for Volatile Organics in water will not be acceptable to the Department. The 624 Method has higher detection limits for several of the Volatile Organics (Benzene, Carbon Tetrachloride, Vinyl Chloride, etc.) than the concentration given for Maximum Contaminant Levels in Title 22, Article 5.5, Section 64444.5. The Department recommends use of EPA Methods 601 and 602 for the analysis of Volatile Organics in water. Please make the appropriate changes to Table 2.5.2-ANALYTICAL METHODS.

Response 1

Table 2.5.2 has been modified to show that analyses for volatile organics will be performed using EPA Methods 601 and 602 for water samples and EPA Methods 8010 and 8020 for soil samples. However, one of the data gaps issues discussed in Section 7.1 of the Public Health and Environmental Evaluation Plan (PHEE) (Volume 7 of the RI/FS Work Plan) requested that "each organic analysis should also include identification by GC/MS of the 10 largest unidentified chromatographic peaks. Subsequent rounds of sampling may then be limited to those compound classes that have been shown to be present in the initial samples." In discussions regarding this question January 19, 1990, DHS agreed to a procedure where during the first sampling event at each location, water and soil samples analyzed for volatile organic compounds will be analyzed by GC/MS methods (EPA Methods 624, 625, 8240, and 8270). During subsequent sampling events at each location, water and soil samples analyzed for volatile organic compounds will be analyzed by GC methods (EPA Methods 601, 602, 8010, and 8020). The use of Method 624 and 625 for the initial chemical analysis is also in accordance with the standard protocol recommended by the California Regional Water Quality Control Board (RWQCB) for newly installed monitoring wells. Table 2.5.2 has been modified to reflect this dual approach.

Comment 2

In locations where the investigation is looking for petroleum products, especially AVGAS, the Department recommends testing for Ethylene Dibromide (EDB). Please include EDB in Table 2.5.1 - PARAMETERS TO BE ANALYZED FOR.

Response 2

Ethylene Dibromide (EDB) has been inserted into Table 2.5.1.

Comment 3

Sites where fuel contamination is the major concern should all be running the same analyses - Petroleum hydrocarbons, VOA, Metals, BNA extractables, EDB.

Response 3

These analyses will be performed at sites where potential fuel contamination is the major concern. Tables 3.3.1, 3.7.1, 3.8.1, 3.9.1, 3.15.1, and 3.17.1, have been modified, accordingly.

Comment 4

Place an acronym definition list as the first page in the Table section for easy reference.

Response 4

An acronym definition list has been placed at the bottom of each table, sufficient to define the terms of the table.

D. Comments On Sample Types And Analyses:

Comment 1

Table 3.3.1 SAMPLING TYPES AND ANALYSES/RATIONALE FOR AREA 97
Add Ethylene Dibromide analysis for water samples and VOA for split spoon soil samples. (fuel)

Response 1

Table 3.3.1 has been revised to incorporate this comment.

Comment 2

Table 3.6.1 SAMPLING TYPES AND ANALYSES/RATIONALE FOR BUILDING 41
Add Oil and Grease and PCB analysis for water samples and PCB's for soil samples. (hydraulic fluid)

Response 2

Table 3.6.1 has been revised to incorporate this comment.

Comment 3

Table 3.7.1 SAMPLING TYPES AND ANALYSES/RATIONALE FOR BUILDING 459
Add petroleum hydrocarbon analysis for soil and water samples. Include Ethylene Dibromide analysis for water samples. (fuel)

Response 3

Table 3.7.1 has been revised to incorporate this comment.

Comment 4

Table 3.8.1 SAMPLING TYPES AND ANALYSES/RATIONALE FOR BUILDING 547
Add VOA and BNA extractables analysis for soil and water samples. Add Ethylene Dibromide analysis for water samples. (fuel)

Response 4

Table 3.8.1 has been revised to incorporate this comment.

Comment 5

Table 3.9.1 SAMPLING TYPES AND ANALYSES/RATIONALE FOR BUILDING 162
Add VOA, BNA extractables and Metals analysis for both soil and water samples. Add Ethylene Dibromide analysis for water samples. (Fuel)

Response 5

Table 3.9.1 has been revised to incorporate this comment.

Comment 6

Table 3.10.1 SAMPLING TYPES AND ANALYSES/RATIONALE FOR BUILDING 114
Add Mercury analysis for soil and water samples. (Possible mercury contamination)

Response 6

Table 3.10.1 has been revised to incorporate this comment.

Comment 7

Table 3.12.1 SAMPLING TYPES AND ANALYSES/RATIONALE FOR BUILDING 530
Add BNA extractables analysis for soil samples and Oil and Grease analysis for water samples. (Oil Refinery Wastes)

Response 7

Table 3.12.1 has been revised to incorporate this comment.

Comment 8

Table 3.13.1 SAMPLING TYPES AND ANALYSES/RATIONALE FOR BUILDING 400
Add VOA extractables analysis for soil samples. (Solvents)

Response 8

Table 3.13.1 has been revised to incorporate this comment.

Comment 9

Table 3.14.1 SAMPLING TYPES AND ANALYSES/RATIONALE FOR BUILDING 14
Add VOA, BNA Extractables, Metals and Mercury analysis for both soil and water samples. The building was used an engine test cell and laboratory. (Fuels, oils, solvents, mercury)

Response 9

Table 3.14.1 has been revised to incorporate this comment.

Comment 10

Table 3.15.1 SAMPLING TYPES AND ANALYSES/RATIONALE FOR BUILDING 10
Add BNA extractables analysis for soil samples. (Bunker C fuel)

Response 10

Table 3.15.1 has been revised to incorporate this comment.

Comment 11

Table 3.16.1 SAMPLING TYPES AND ANALYSES/RATIONALE FOR OIL REFINERY
Regarding the "*" note, list only those samples, analysis and rationale that will be collected for investigation of the oil refinery site.

Response 11

Table 3.16.1 now lists only those samples that will be collected for the investigation of the oil refinery site.

Comment 12

Table 3.17.1 SAMPLING TYPES AND ANALYSES/RATIONALE FOR FIRE TRAINING AREA
Add petroleum hydrocarbon analysis for soil samples. (Fuels) Add Oil and Grease analysis for water samples. (Waste Oils)

Response 12

Table 3.17.1 has been revised to incorporate this comment.

Comment 13

Table 3.18.1 SAMPLING TYPES AND ANALYSES/RATIONALE FOR BUILDINGS 301 & 389
Add Pesticides/PCBs analysis for water samples. (PCB waste oil)

Response 13

Table 3.18.1 has been revised to incorporate this comment.

Comment 14

Table 3.20.1 SAMPLING TYPES AND ANALYSES/RATIONALE FOR SEAPLANE LAGOON
Add Mercury analysis for sediment and water samples. (Waste Stream)

Response 14

Table 3.20.1 has been revised to incorporate this comment.

Comment 15

Table 3.21.1 SAMPLING TYPES AND ANALYSES/RATIONALE FOR STATION SEWER SYSTEM
Add Mercury analysis for soil and water samples. (Waste Stream)

Response 15

Table 3.21.1 has been revised to incorporate this comment.

Comment 16

Table 3.22.1 SAMPLING TYPES AND ANALYSES/RATIONALE FOR YARD D-13
Add Oil and Grease analysis for water samples. (Waste Oil)

Response 16

Table 3.22.1 has been revised to incorporate this comment.

Comment 17

Table 3.23.1 SAMPLING TYPES AND ANALYSES/RATIONALE FOR THE ESTUARY
Add Mercury analysis for sediment samples. (Waste Stream)

Response 17

Table 3.23.1 has been revised to incorporate this comment.

E. General Comments On Sampling Plan:

Comment 1

There is no discussion as to how the soil generated during soil borings, water produced during well development or decontamination water produced from steam cleaning will be characterized prior to disposal. There is no discussion of the treatment or disposal methods which will be used. Disposal of untreated material in a landfill is not a desirable option.

Response 1

Decontamination water produced from steam cleaning will be characterized prior to disposal. This has been addressed in Section 2.1 of the Sampling Plan. Water produced during well development will also be characterized prior to disposal. This has been addressed in Section 5.3.3.3 of the QAPP. Soil cuttings generated during drilling operations will be characterized prior to disposal. This issue has been addressed in Section 5.3.2.6 of the QAPP. With respect to the treatment or disposal methods and associated locations, it is premature at this stage of the project to determine the actual methods and locations because of the unknown nature, extent, and quantities of chemicals at each specific site. No treatment of contaminated soil or water will take place on-site for the RI/FS.

Comment 2

In cases where monitor wells are being installed in areas with petroleum contamination the Department requests testing for a floating product layer and determination of thickness, if present.

Response 2

Evaluation of the floating product layer and thickness will be performed in monitoring wells at sites of potential petroleum contamination. This testing has been addressed and incorporated into Sections 3.3.7, 3.7.7, 3.8.7, 3.12.6, 3.14.6, 3.17.6, 3.18.6, 3.19.6, and 3.22.6 of the Sampling Plan.

Comment 3

Monitoring well screen lengths will not exceed 10' unless otherwise accepted in writing by the Department.

Response 3

This issue has been addressed and incorporated into Section 4.5.1 of the QAPP.

F. Sampling Plan Site Specific Comments

Comment 1 (Page 6, Paragraph 5, Line 1)

Section 2.1 Make this a complete sentence.

Response 1

This revision has been made in Section 2.1 of the Sampling Plan.

Comment 2 (Page 13, Paragraph 1, Line 7)

How will the hexane used for decontamination of equipment be disposed of? Recycled?

Response 2

Very small amounts of hexane are generated during these decontamination procedures, and this amount is caught in a pan where it usually evaporates almost immediately during the decontamination process. Any waste hexane remaining will be collected and containerized. If the amounts collected are large enough to be accepted by a recycler, recycling will be used for disposal.

Comment 3 (Page 15, Section 2.8)

Will monitor well elevations be reported relative to Mean Sea Level (MSL) or to a ANAS datum reference point as in the Verification & Confirmation Study. If then ANAS datum is used please make sure it is identified on drill logs and in reports.

Response 3

Monitoring well elevations will be referenced to the Mean Lower Low Water (MLLW) datum during the course of the investigation. This datum reference point was established by the U.S. Navy for nautical purposes. This comment has been incorporated into Section 2.8 of the Sampling Plan. Section 5.4.1 of QAPP has also been modified to reflect the MLLW datum.

Comment 4 (Page 17, Sections 3.1 and 3.2)

The Solid Waste Assessment Test (SWAT) proposal does not address sampling or analysis of contaminants migrating from either the 1943-1956 landfill or the West Beach landfill into the San Francisco sediments. See comments on SWAT.

Response 4

Refer to our responses in the SWAT comments.

Comment 5 (Page 17, Sections 3.1 and 3.2)

The Department recommends sampling along the west side of the landfills in the bay sediments. Bioassay testing may be required depending on sampling analysis results.

Response 5

Sampling activities will be performed along the west side of both landfills to check for soil contamination within the bay sediments. If the chemical analyses reveal signs of contamination, then bioassay testing will be performed at these locations. Sections 3.2.2.2 and 3.3.2 in Volume 1A of the SWAT have been modified to reflect these additional sampling activities. Section 3.26.1, Figure 3.26.1, and Tables 3.26.1 and 3.26.2 have been added to Volume 1 of the Sampling Plan, to describe the off-shore sampling activities.

Comment 6 (Page 18, Section 3.3.1.2)

What is meant by the tanks were "destroyed" in place? Was the concrete decontaminated, left as fill, hauled away?

Response 6

The concrete tanks were destroyed in-place and were not decontaminated prior to closure.

Comment 7 (Page 19, Section 3.3.1.3, Line 3)

Regarding the monitor wells that were "destroyed" prior to landscaping; were they properly abandoned? If not, they will have to be "found" and properly abandoned.

Response 7

The wells were apparently destroyed during the destruction of the concrete tanks mentioned in Response No. 6. The Navy is uncertain about the methods used to abandon the wells.

During the January 19, 1990 meeting between DHS and the Navy, DHS inquired about obtaining more data on the location, depth, and construction details of the monitoring wells at Area 97. Through further review of the Subsurface Fuel Contamination Final Report prepared by Kennedy Engineers in 1980, additional information was presented in the report regarding the depth and location of the monitoring wells; however, no information on well construction details was provided.

Comment 8 (Page 24, Paragraph 3, Line 1)
Section 3.4.2

Explain rationale for placing sampling grid in the western side of the plating shop. Was that area a storage area?

Response 8

The rationale for placing the sampling grid within this area is because it was previously used and is currently used as a storage area. Figure 3.4.2 has also been modified, accordingly.

Comment 9 (Page 28, Section 3.5.1.2)

Did the Industrial Waste Collection System (IWCS) discharge directly into the Seaplane Lagoon during this time or was the waste treated and sent to the sewer system?

Response 9

Prior to 1970, there was no treatment facility for industrial waste that was generated at the station. The wastes were apparently discharged to the Seaplane Lagoon or the Oakland Estuary.

Comment 10 (Page 37, Section 3.7.1.3)

This section states that no sampling or analysis has occurred. Figures 3.7.1.2 and 3 identify existing monitor wells adjacent to the underground storage tank (UST) pads. Why not sample the existing wells and use the results for assistance in placement of the proposed monitor wells and borings? State the condition of the existing wells.

Response 10

The existing monitoring wells will be sampled. The results of this sampling will be used for designing the locations of the proposed wells and borings.

Comment 11 (Page 37, Section 3.7.3)

How will the boundaries of the USTs and locations of the fuel lines be determined? Magnetometers, Visual, Trench?

Response 11

Underground storage tanks and associated fuel line locations will be determined using one or a variety of methods, as further discussed in Section 3.7.3.

Comment 12 (Page 38, Section 3.7.5)

Soil borings will also be placed based on soil gas survey results.

Response 12

Section 3.7.4 states this fact.

Comment 13 (Page 40, Section 3.8.1.2)

It can be "assured" that water entered the UST, but it cannot be confirmed that gasoline did not leak out of the ruptured tank. In order to be "assured" that gasoline did not leak out, it would have to be confirmed that the top of the UST tank was below the lowest ground water level. If the tank was full of fuel when the rupture occurred and the groundwater level was low, fuel could escape into the groundwater. The only way it could be assured that water entered into the UST immediately after the rupture is if the person with the dipstick noticed an immediate rise to the fuel level. What happened to the ruptured UST? Was it abandoned in place? Was the fuel removed?

Response 13

The tank was ruptured in 1980 and apparently tank-tested in 1987. The tank was repaired between 1980 and 1987. No records documenting the repair are available. After the tank testing in 1988; the tank fuel was removed. No records of the abandonment procedure are available.

Comment 14 (Page 41, Paragraph 1, Line 3)

What does this sentence mean? How will you locate the tanks and associated plumbing?

Response 14

Proposed boring and well locations will be strategically positioned to delineate contaminant plumes depending on the actual tank and fuel line locations. This sentence has been modified in the Section 3.8.3 text.

Tank and fuel line locations will be verified prior to the subsurface investigation, using methods similar to those discussed in Response No. 11.

Comment 15 (Page 43, Section 3.9.1.2)

Have geophysical techniques been used to locate USTs here? Did ERM-West conduct a UST search in 1987?

Response 15

No geophysical techniques have been used to locate the USTs at this site. ERM-West did not conduct a UST search in 1987.

Comment 16 (Page 45, Paragraph 2, Line 1)
Section 3.9.4

Soil borings will extend to a depth of 15 not 10 feet.

Response 16
Section 3.9.4 has been modified to reflect this comment.

Comment 17 (Page 47, Section 3.10.1.2)

Where were the materials (pesticides) stored in building 114 and in what quantity and manner (55 gallon drum, 5 gallon plastic buckets.) Do the proposed sampling points cover the storage areas?

Response 17

The pesticides are stored at present in small metal and cardboard containers in an outside shed along the northeast corner of the south wing of Building 114. Two additional sampling points have been incorporated onto Figure 3.10.2 to cover the storage area.

Comment 18 (Page 62, Section 3.14.1.2)

The given description is adequate for the laboratory, but what about the buildings other function as an engine test cell facility. How long was Building 14 used as an engine testing facility? What type of engines, reciprocating, jet, both? What types of fuels were used, where was the fuel supplied from, where do the fuel lines run, was hydraulic fluid used? When engine failures occurred were solvents used to clean up?

Response 18

Building 14 was constructed in 1946 and was used for propeller testing during the 1950s and for jet engine testing during the 1970s. Fuel types used during testing include AVGAS, JP-5 (jet fuel), and JP-7. The fuel was supplied from the fuel farm. The fuel lines extend underground from the fuel farm and connect to the top of the roof in Building 14. No hydraulic fluid was used. Several solvents were used to cleanup, including PD-680 and BNB 3100. Other general purpose chemicals used to clean the engine and spills include catane, 10-10 oil, lubrication oil, and synthetics.

Comment 19 (Page 62, Section 3.14.1.2)
Section 3.14.1.2

The recommendation is made that no further investigation of mercury contamination is warranted, yet there are indications that mercury was washed down drains into the IWCS and the sewer system. The IWCS does leak. It has been reported that the two production wells at the station were closed due to high "natural" mercury. The geologic environment is such that natural mercury levels should not be high. The Department recommends further investigation.

Response 19

Navy personnel have stated that minor mercury spills have occurred at Building 14, but that actual spill locations were undocumented. To evaluate the extent of potential mercury contamination at this site, soil borings will be drilled at points likely to leak in the drain sewers existing from the building. The text of Sections 3.14.1.2, 3.14.2, 3.14.3, and 3.14.4 have been revised to include these additional borings.

It is agreed that the two production wells at the station were closed due to high mercury content, but because geologic conditions have not been extensively explored at the station, it is premature to conclude that the natural mercury levels should not be this high.

Comment 20 (Page 63, Section 3.14.3)

Building 14 is not included in the Area 97 soil gas investigation. There are only five nearby soil gas survey points and all of them are north of Building 14.

Response 20

The soil gas survey will be extended southward to include the Building 14 area. The area to be encompassed is shown on Figures 3.3.1 and 3.14.2. Section 3.14.3 has been modified to reflect this additional work.

Comment 21 (Page 65, Section 3.15.1.1)

When were the eight above-ground fuel storage tanks installed? The current fuel storage tanks and abandoned USTs should be shown in Figure 3.15.2.

Response 21

Nine above-ground fuel storage tanks were installed over the course of several years between the 1960's and mid 1970's. These above-ground tanks presently occupy the south side of Building 10. The Navy Public Works has indicated that the abandoned USTs are located along the northeast side of Building 10. Their approximate locations have also been observed during a recent site visit. Figure 3.15.2 has been modified to illustrate their approximate locations.

Comment 22 (Page 69, Section 3.16.2)

The Department proposes that the boring above the north-east corner of CANS C-2 (Fig. 3.16.1) be located further to the north-east and adjacent to Central Ave. (see DHS attached Figure 1). The boring should be made a monitor well to determine if the groundwater at the south-east corner of the oil refinery is contaminated and indicate if contaminated groundwater has moved off ANAS.

Response 22

Figure 3.16.1 has been modified to reflect this comment.

Comment 23 (Page 72, Section 3.17.2)

Why not run a soil gas survey at the sampling grid prior to taking 45 soil samples and analyzing them all? The survey may help eliminate unneeded sampling analyses.

Response 23

A soil gas survey will initially be conducted using the same sampling grid as presented on Figure 3.17.1, in order to provide baseline reconnaissance data. It is agreed that this approach will help eliminate unnecessary sampling and chemical analyses, in addition to providing enough data for planning future investigation activities. Section 3.17.3.1 has been incorporated into the text which discusses the soil gas sampling as the initial reconnaissance tool. Subsequent soil sampling protocols have been modified in Section 3.17.4. Figure 3.17.1 has also been modified, accordingly.

Comment 24 (Page 72, Section 3.17.4)

Text states that there will be two soil borings while Figure 3.17.1 shows three monitor wells. Section 3.17.6 says that water samples will be collected from two wells but Table 3.17.2 identifies three wells. Please clear this up.

Response 24

Three monitoring wells will be installed at the Fire Training Area. These sections and tables mentioned in this comment have been corrected.

Comment 25 (Page 78, Section 3.19.2)

Line 2; change "access" to assess.

Response 25

This change has been incorporated into Section 3.19.2.

Comment 26 (Page 81, Section 3.20.1.2)

Line 1; There are five outflows into the lagoon-'85 Wahler, Fig. 7, '83 E&E, Fig. 6.20.

Response 26

Based on a recent review of the NAS Alameda Utilities Sewer and Storm Drainage Master Plan, there are seven outfall locations in the Seaplane Lagoon. These locations have been plotted onto Figure 3.20.1. Section 3.20.1.2 also has been modified to reflect this information.

Comment 27 (Page 82, Section 3.20.2)

Line 5; What activities at Pier 1 may have contributed to contamination at the lagoon?

Response 27

Earlier occasional spills of oil and fuel at Pier 1 may have contributed to contamination at the Lagoon, which were apparently discharged through the Station's storm drain system.

Comment 28 (Page 83, Section 3.20.4)

Briefly describe the sampling procedures used to collect the sediment samples. The reference U.S. EPA, 1977, is not listed in the references section.

The Department recommends four more sediment sampling points be added to the Seaplane Lagoon sampling plan. The sampling points should be placed as shown in DHS attached Figure 2. Addition of these sampling points would change the number of sediment samples shown in Table 3.20.2.

Response 28

This reference has been added to the reference list. Four additional sampling points have been added to the Seaplane Lagoon sampling plan, as shown on Figure 3.20.1. and Table 3.20.2. Section 3.20.4 was also modified to reflect this additional sediment sampling near the outfall locations. Note that additional sampling has been requested in the Seaplane Lagoon in Data Gaps Issue 9 below.

Comment 29 (Page 87, Section 3.22.4)

The text states that a total of six borings will be placed in Yard D-13. Three of the borings will be randomly placed inside the fenced yard and three outside the fenced area. Figure 3.22.1 shows twelve, evenly spaced, soil boring locations and four monitor wells. All sixteen borings are shown to be within the fenced yard. Please clarify the situation.

Response 29

The text in Section 3.22.4 has been modified to reflect the actual number of borings, shown on Figure 3.22.1.

Comment 30 (Page 90, Section 3.23.1.3)

The reference to the U.S. Army Corps of Engineers, 1987 and U.S. EPA, 1977 is not listed in the references section. Briefly describe the sampling procedures to be used for sediment collection.

Response 30

These references were originally incorporated into the reference section. The dates shown in the reference footnotes have been corrected, accordingly. The sampling procedures to be used for sediment collection are fully described in Section 5.3.2.4 of the QAPP.

The Navy's responses to the comments from DHS have been outlined above. In addition to these responses, additional revisions to the Sampling Plan have been made to address the data gaps issues which were discussed in Chapter

7.0 of the PHEE. These data gaps issues, along with each Navy response, are outlined in the paragraphs which follow.

Data Gaps Issue 1:

Table 7-1 of the PHEE has listed additional laboratory analyses which will be necessary to provide the data needed to perform the public health and environmental evaluation. Additional discussion of these data needs is presented in the PHEE in Section 7.1. The text and tables which present the sample types and analyses/rationale for the sites covered by the Sampling Plan have been revised to cover the additional analyses needed.

Data Gaps Issue 2:

Section 7.1 of the PHEE states that "each organic analysis should also include identification by GC/MS of the 10 largest unidentified chromatographic peaks." The various tables of the Sampling Plan which cover analytical methods have been revised to incorporate their requirement for the first water and soil samples taken at each location. This analysis by GC/MS will be in addition to the analyses by GC methods requested by DHS.

Data Gaps Issue 3:

Section 7.1.1 of the PHEE has requested that surface soil samples be collected from the upper two inches of the soil column for analysis. The Sampling Plan has been revised to include this sampling at all boring locations and background sample locations.

Section 7.1.2 of the PHEE also requests that in areas where high levels of surface soil contamination is revealed, surface soil samples should be analyzed for pH and organic content. A representative selection of surface soil samples should also be subjected to sieve analysis, in-place soil density testing, and permeability. These requirements have also been incorporated into the Sampling Plan.

Data Gaps Issue 4:

Background soil samples have been requested in Section 7.1.1 of the PHEE. It is stated there that a minimum of three background samples are required for each stratum of soil. This requirement has been incorporated into the Sampling Plan in Section 3.25.

Data Gaps Issue 5:

Section 7.1.2 of the PHEE requests that subsurface samples should be tested for pH and total organic content. This requirement has been incorporated into the Sampling Plan tables covering sample types and analyses/rationale.

Data Gaps Issue 6:

Section 7.1.3 of the PHEE has requested that ground water samples be analyzed for certain parameters including pH, total organic carbon, dissolved oxygen, anions (sulfate, chloride), and cations (metals, calcium). These requirements have been incorporated into the tables of sample types and analyses/rationale.

Data Gaps Issue 7:

Section 7.1.3 of the PHEE has requested installation of pressure transducers in additional monitoring wells near the shore in the vicinity of the seaplane lagoon. These will be used to provide a continuous record of water levels to determine the tidal and seasonal influences. This requirement has been addressed in Section 3.26 of the Sampling Plan.

Data Gaps Issue 8:

Section 7.1.3 of the PHEE has requested background samples of ground water at the site from at least three locations. This has been addressed in Section 3.25 of the Sampling Plan, where four locations for background sampling are described.

Data Gaps Issue 9:

Section 7.1.4 of the PHEE has requested that surface water samples be collected at all of the grid points in the Seaplane lagoon, and that additional surface water and sediment samples be collected from the vicinity of the storm drain outfalls in the Seaplane lagoon and the Oakland Inner Harbor, from locations of suspected ground water discharge, and from San Francisco Bay along the southern shoreline of NAS Alameda. Additional chemical analyses for surface water and sediment samples have also been requested. These requirements have been addressed in the Sampling Plan in Sections 3.20, 3.23, and 3.26.

Data Gaps Issue 10:

Section 7.1.5 has requested surface water and sediment samples from the wetlands area west of the Seaplane Lagoon. This has been addressed in the Sampling Plan in Section 3.24.

Data Gaps Issue 11:

A number of bioassay and tissue residue analyses have been requested in Section 7.1.6 of the PHEE. These requirements have been discussed in the Sampling Plan in Sections 3.20, 3.23, 3.24, and 3.26.

Data Gaps Issue 12:

Section 7.1.7 of the PHEE has requested additional analyses for air samples. These requirements have been addressed in the text and tables of the Sampling Plan.

Finally, in addition to the revisions to address the comments from DHS and the data gaps noted above, some minor revisions to the text of the Sampling Plan have been made to bring this volume in line with the procedures in the revised QAPP.

In addition, the proposal to perform geophysical logging of the soil borings has been deleted. This procedure would be inappropriate in the relatively shallow borings at the sites covered by the Sampling Plan. The text of the Sampling Plan has been revised to indicate that borings will be lithologically logged, but not geophysically logged.

N00236.000785
ALAMEDA POINT
SSIC NO. 5090.3

FINAL SAMPLING PLAN
REMEDIAL INVESTIGATION/FEASIBILITY STUDY (RI/FS)
VOLUME 1 OF 8

DATED 01 FEBRUARY 1990

THIS RECORD CONTAINS MULTIPLE VOLUMES WHICH HAVE BEEN ENTERED SEPARATELY

VOLUME 1A OF 8 – FINAL SAMPLING PLAN, SOLID WASTE ASSESSMENT TEST PROPOSAL ADDENDUM, RI/FS DATED 2/1/89 IS ENTERED IN THE DATABASE AND FILED AT ADMINISTRATIVE RECORD NO. **N00236.000311**

VOLUME 1A OF 8 – FINAL SAMPLING PLAN, SOLID WASTE ASSESSMENT TEST PROPOSAL ADDENDUM, RI/FS DATED 12/1/89 IS ENTERED IN THE DATABASE AND FILED AT ADMINISTRATIVE RECORD NO. **N00236.000789**

VOLUME 1A OF 8 – FINAL SAMPLING PLAN, SOLID WASTE ASSESSMENT TEST PROPOSAL ADDENDUM, RI/FS DATED 2/1/90 IS ENTERED IN THE DATABASE AND FILED AT ADMINISTRATIVE RECORD NO. **N00236.000786**

N00236.000785
ALAMEDA POINT
SSIC NO. 5090.3

VOLUME 1B OF 8 – FINAL AIR SAMPLING PLAN, RI/FS DATED 12/1/88 IS ENTERED IN THE DATABASE AND FILED AT ADMINISTRATIVE RECORD NO. **N00236.000275**

VOLUME 2 OF 8 – FINAL HEALTH AND SAFETY PLAN, RI/FS DATED 12/1/88 IS ENTERED IN THE DATABASE AND FILED AT ADMINISTRATIVE RECORD NO. **N00236.000274**

VOLUME 2 OF 8 – REVISED FINAL HEALTH AND SAFETY PLAN, RI/FS DATED 5/1/89 IS ENTERED IN THE DATABASE AND FILED AT ADMINISTRATIVE RECORD NO. **N00236.000351**

VOLUME 2 OF 8 – REVISED FINAL HEALTH AND SAFETY PLAN, RI/FS DATED 11/1/89 IS ENTERED IN THE DATABASE AND FILED AT ADMINISTRATIVE RECORD NO. **N00236.000780**

VOLUME 3 OF 8 – FINAL QUALITY ASSURANCE PROJECT PLAN – QUALITY ASSURANCE / QUALITY CONTROL PLAN, RI/FS DATED 5/1/89 IS ENTERED IN THE DATABASE AND FILED AT ADMINISTRATIVE RECORD NO. **N00236.000341**

VOLUME 3 OF 8 – FINAL QUALITY ASSURANCE PROJECT PLAN – QUALITY ASSURANCE / QUALITY CONTROL PLAN, RI/FS DATED 1/1/90 IS ENTERED IN THE DATABASE AND FILED AT ADMINISTRATIVE RECORD NO. **N00236.000782**

VOLUME 4 OF 8 – COMMUNITY RELATIONS PLAN, RI/FS DATED 2/15/89 IS ENTERED IN THE DATABASE AND FILED AT ADMINISTRATIVE RECORD NO. **N00236.000301**

VOLUME 5 OF 8 – FINAL PROJECT MANAGEMENT PLAN/SCHEDULE, RI/FS DATED 2/1/89 IS ENTERED IN THE DATABASE AND FILED AT ADMINISTRATIVE RECORD NO. **N00236.000322**

VOLUME 6 OF 8 – DATA MANAGEMENT PLAN, RI/FS DATED 5/1/89 IS ENTERED IN THE DATABASE AND FILED AT ADMINISTRATIVE RECORD NO. **N00236.000361**

VOLUME 7 OF 8 – FINAL PRELIMINARY PUBLIC HEALTH AND ENVIRONMENTAL EVALUATION PLAN, RI/FS DATED 6/1/89 IS ENTERED IN THE DATABASE AND FILED AT ADMINISTRATIVE RECORD NO. **N00236.000371**

N00236.000785
ALAMEDA POINT
SSIC NO. 5090.3

VOLUME 8 OF 8 – FINAL FEASIBILITY STUDY PLAN, RI/FS DATED 1/1/90 IS ENTERED IN THE DATABASE AND FILED AT ADMINISTRATIVE RECORD NO. **N00236.000783**